

# Occlusion Analyzer



Version 1.0 (March 2023)



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# Getting Started

## Medit Occlusion Analyzer Overview

Medit Occlusion Analyzer is an app developed to help you streamline the routine task of examining the occlusions.

It can automatically analyze the occlusal interferences between the maxilla and mandible and display the results through a color map. With the provided Section View tool, you can also study the occlusal relationship more thoroughly - create multiple sections, compare them simultaneously in Multi-View, and measure distances. You can also realign and edit data in the app if needed. Import the recordings of mandibular movement into Medit Occlusion Analyzer to enhance the analysis process.

## Intended Use and Disclaimer

1. Medit Occlusion Analyzer was not developed for medical or clinical use, and thus cannot be used for the following purposes:
  - Diagnosing, treating, mitigating, or preventing diseases
  - Diagnosing, treating, mitigating, or preventing injuries or disorders
  - Inspecting, replacing, or transforming a structure or function
2. The user is entirely responsible for the process of analysis and interpretation of the analysis results. Medit does not take any responsibility or liability for any misinterpretation that might happen.

The application is to be used solely for general communication and consultation purposes.

# System Requirements

## Windows

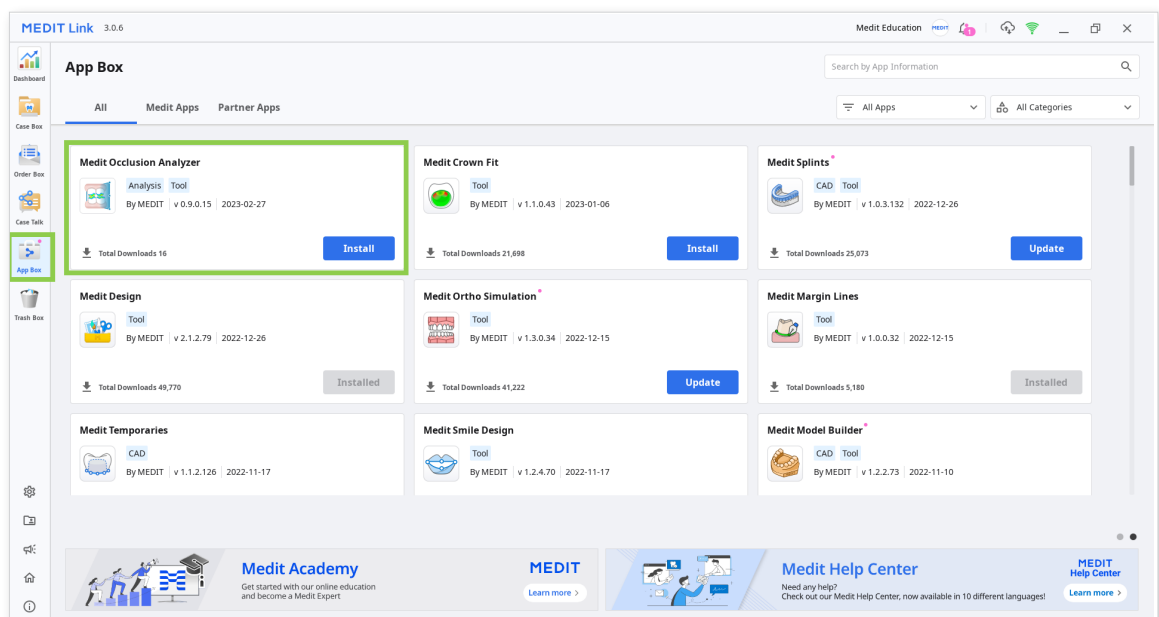
<b>CPU</b>	Intel Core i5. 2.6 GHz or higher
<b>RAM</b>	16GB or higher
<b>Graphic Card</b>	NVIDIA GeForce GTX 1060 (2GB) or higher
<b>OS</b>	Windows 10 64-bit, Windows 11 64-bit

## macOS

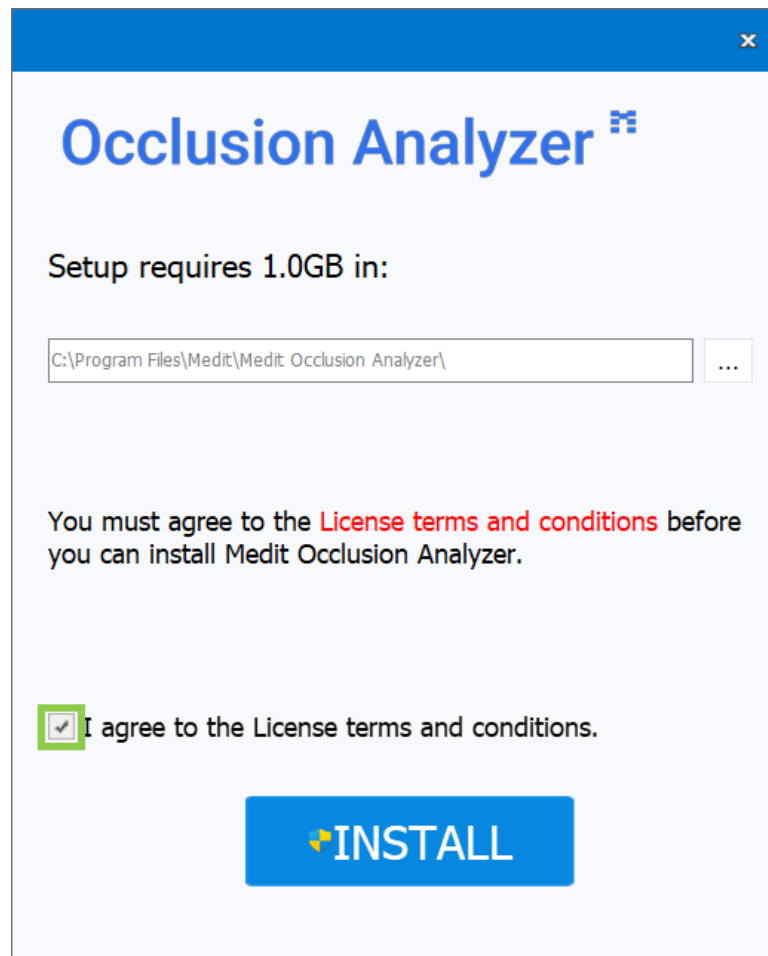
<b>Chip</b>	M1/M2 or higher
<b>CPU</b>	8-core or higher
<b>RAM</b>	16GB or higher
<b>OS</b>	Monterey 12

# Installation Guide

1. Log in to your Medit Link account and go to the App Box.
2. Find the Medit Occlusion Analyzer app and click “Install.”



3. Once the download is complete, the app installer will run automatically.
4. Read and agree to the License Terms and Conditions to continue.

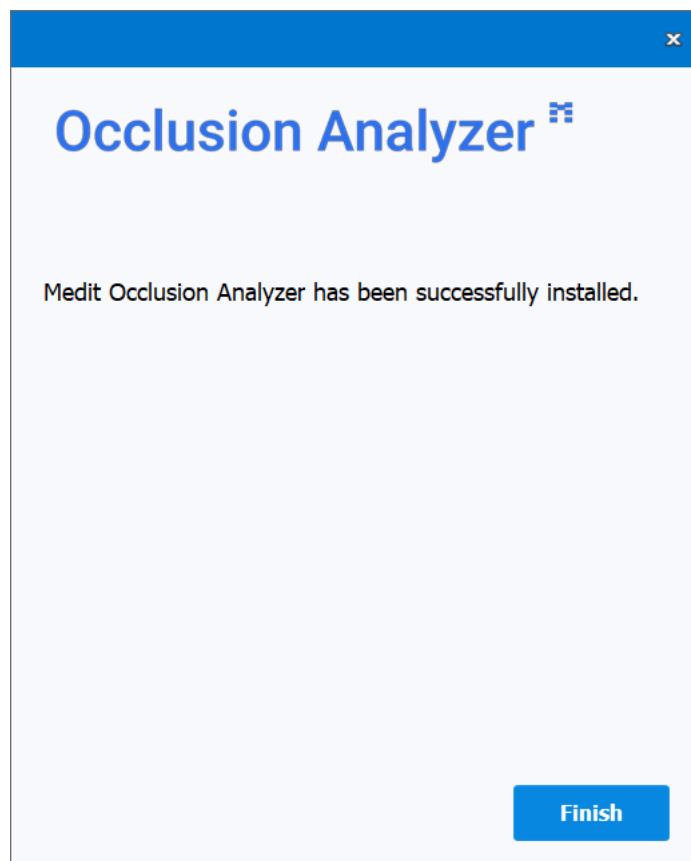


5. It may take several minutes to finish the installation process.



Do not turn off the PC until the installation is complete.

6. Click "Finish" to complete the process.



## Running Medit Occlusion Analyzer from Medit Link

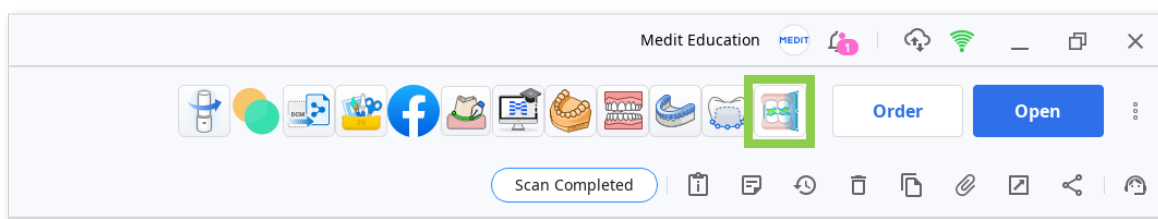
Follow these steps to run Medit Occlusion Analyzer from Medit Link.

1. Go to Case Box (Clinic account) or Work Box (Lab account) and open the case you would like to use in the app.



Check your scan data. The case must include both the maxilla and mandible and at least one occlusion scan.

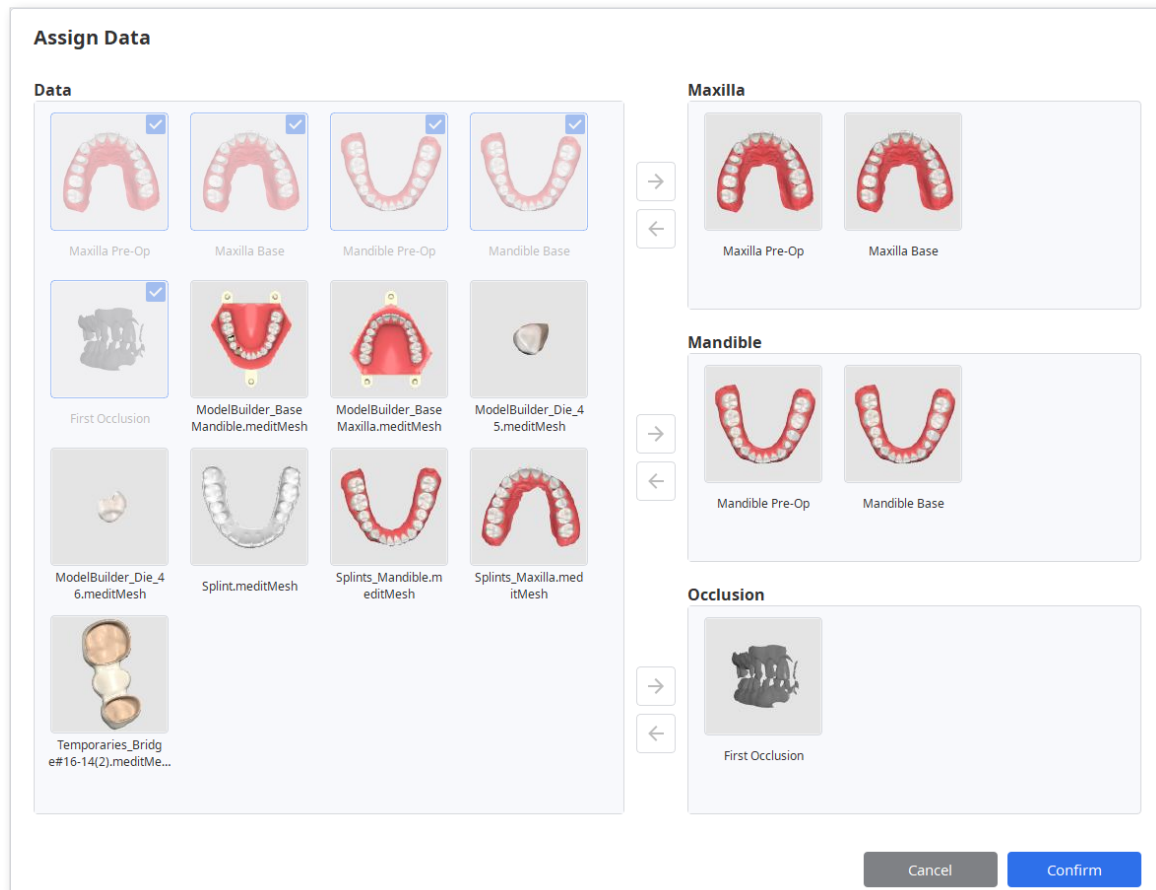
2. Click the Medit Occlusion Analyzer icon at the top of the Case Detail window. The icon will automatically appear once you have installed the app.



3. Scan data acquired in Medit Scan software will be automatically assigned as maxilla, mandible, and occlusion.



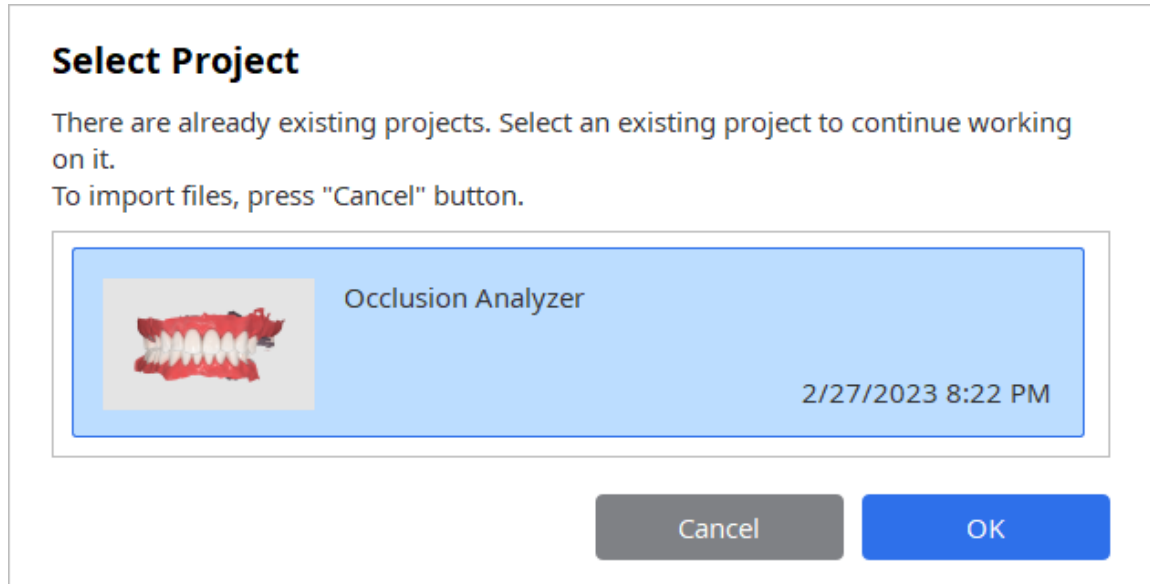
Note that you can assign multiple data to each. CAD data can also be used.



4. After clicking "Confirm" you will be directed to Auto Analysis Mode.

5. If you run the app from a case with a saved project, you will be asked whether you want to continue working on it.

Select a project and click "OK." To start a new one, click "Cancel."






# Data Management

## Acquiring 3D Data

There are several ways to prepare 3D data that will be used in the app:


### 1. Acquire scan data in Medit Scan for Clinics or Labs

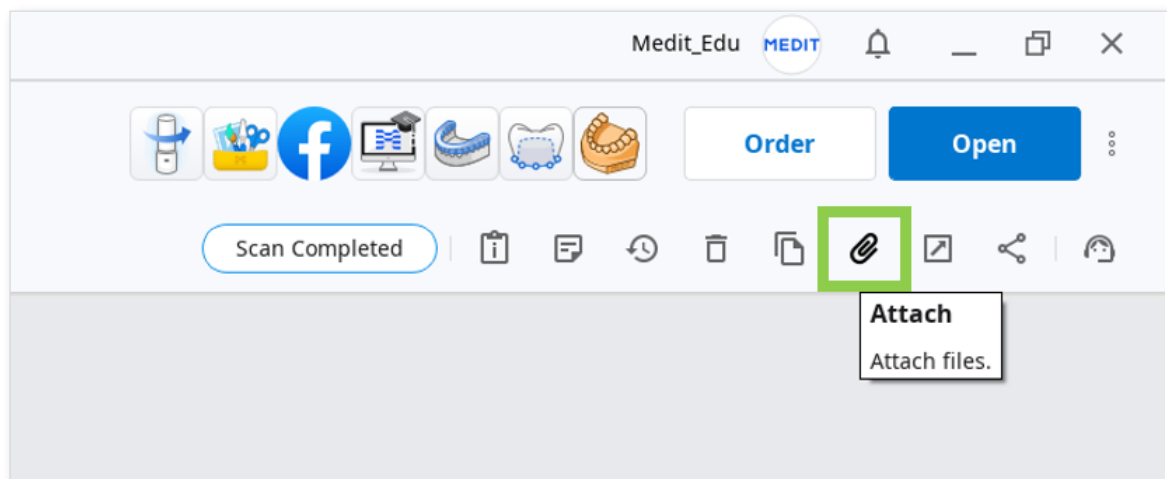
Complete the necessary scans in Medit Scan for Clinics or Labs and save them to the case. The app will automatically import data from the case that you run it from.

 To run the app, you must have the maxilla, mandible, and at least one occlusion scan.

### 2. Attach files to the Medit Link case






Import data files from the local PC to the case using the “Attach” feature in the Case Detail window.

 Note that the use of some features may be limited when using thirdparty scan data.















## 3D Data Control

### 3D data control using a mouse:

Use	Description	Image
Zoom	Scroll the mouse wheel.	
Zoom Focus	Double-click on the data.	
Zoom Fit	Double-click on the background.	
Rotate	Right-click and drag.	
Pan	Hold both buttons (or wheel) and drag.	

### 3D data control using a mouse and keyboard:

Use	Windows	macOS
Zoom		
		
Rotate		
		
Pan		
		

## Saving 3D Data

If you made any changes to your 3D data in the Edit or Alignment Modes, you can save them by clicking “Complete” on the left-side panel.

Two options are available for saving changes: overwrite and export.



Note that CAD data can only be exported.

### Save 3D Data

How would you like to save the files?

**Overwrite**

Save changes by overwriting the existing data files in Medit Link.

**Export**

Save changes by creating new files in Medit Link without changing the existing ones.

Cancel



You can still save your work project even if you click "Exit."

### Exit Options

**Exit Program After Saving**

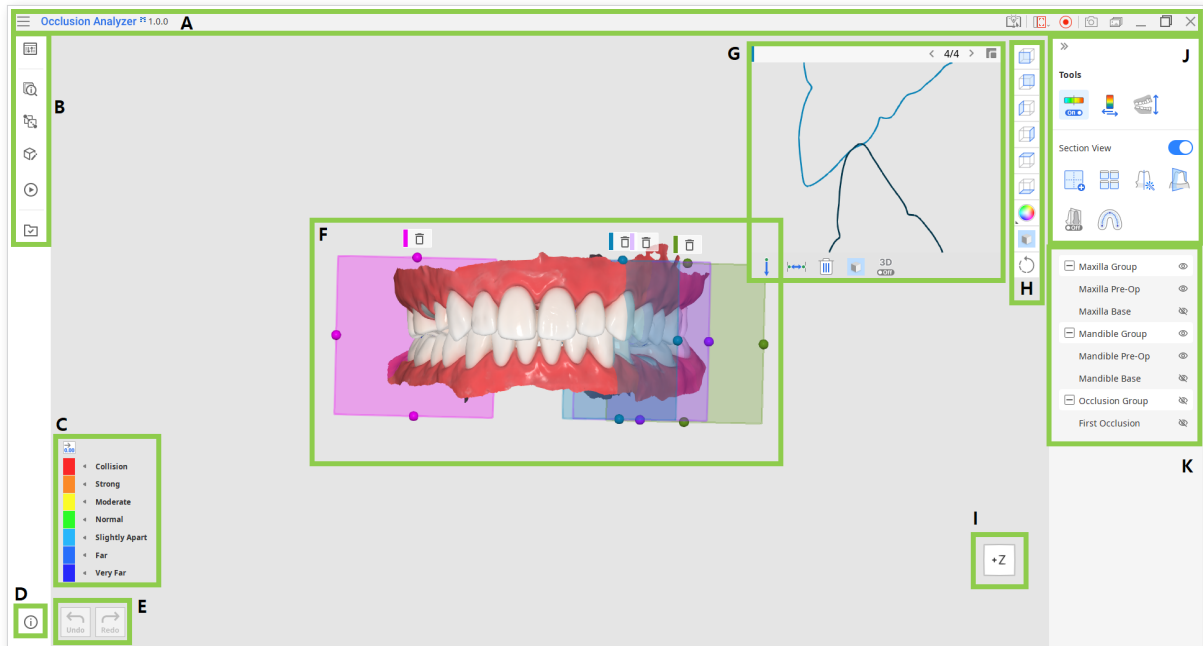
Save all current progress and terminate the program.

**Exit Program Without Saving**

Terminate the program without saving any of the current progress.

Cancel

# User Interface



A. Title Bar  
B. Modes  
C. Color Bar  
D. Information

E. Undo/Redo  
F. 3D Data  
G. Section View Window  
H. Side Toolbar

I. View Cube  
J. Tools Panel  
K. Data Tree



Clicking the “Information” icon will navigate you to a specific Medit Help Center page with instructions on the corresponding mode.



## Title Bar

The Title Bar includes the following elements:

<b>Menu</b>	Adjust settings, access available assistance resources, and check application details.
<b>Help Center</b>	Go to the Medit Help Center page.
<b>Select Video Record Area</b>	Select the area to be recorded for the video capture.
<b>Start Video Recording</b>	Start the video capture.
<b>Screenshot</b>	Take a screenshot. Capture the app with or without the title bar using automatic selection. Or click and drag to manually select the area for a screenshot.
<b>Screenshot Manager</b>	Manage screen capture images.
<b>Minimize</b>	Minimize the application window.
<b>Maximize or Restore</b>	Maximize or restore the application window.
<b>Exit</b>	Close the application.

## Undo/Redo


There are two buttons that provide action control. Use them to undo or redo your recent action.

<b>Icon</b>	<b>Tool</b>	<b>Description</b>
 <b>Undo</b>	Undo	Undo the previous action.
 <b>Redo</b>	Redo	Redo the previous action.






## Side Toolbar

The Side Toolbar provides a set of tools for controlling the view options and data display.

### 3D Data View Options

Icon	Tool	Description
	+Z Axis View	See the front view.
	-Z Axis View	See the back view.
	-X Axis View	See the left view.
	+X Axis View	See the right view.
	+Y Axis View	See the top view.
	-Y Axis View	See the bottom view.
	Grid Settings (mm)	Show or hide the grid. (Overlay on/off) Click multiple times to control overlay options.
	Rotate	Left-click and drag to rotate the data.  Useful when you use touch screen.

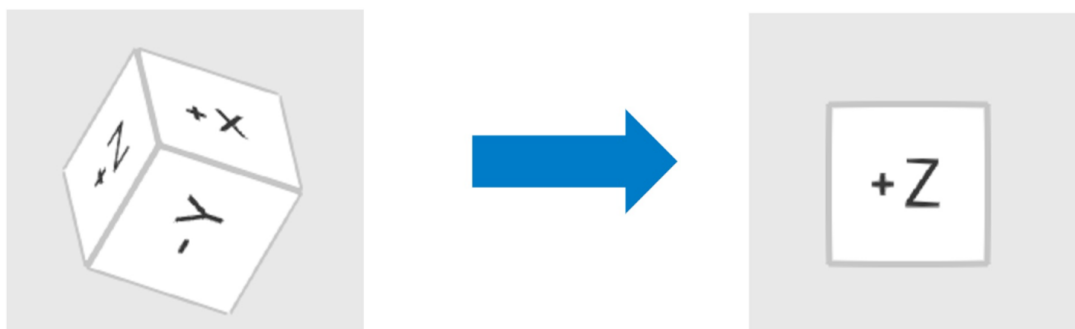
## Data Display Modes

Icon	Tool	Description
	Textured	See the data with color information.
	Textured with Edges	See the data with color information and edges.
	Monochrome	See the data in a single color.
	Monochrome with Edges	See the data in a single color with edges.
	Wire-Frame	See the data as edges only.

## View Cube

View Cube is a navigation tool for the abstract 3D environment. As you rotate your scan data, the cube turns to reflect the current view direction.

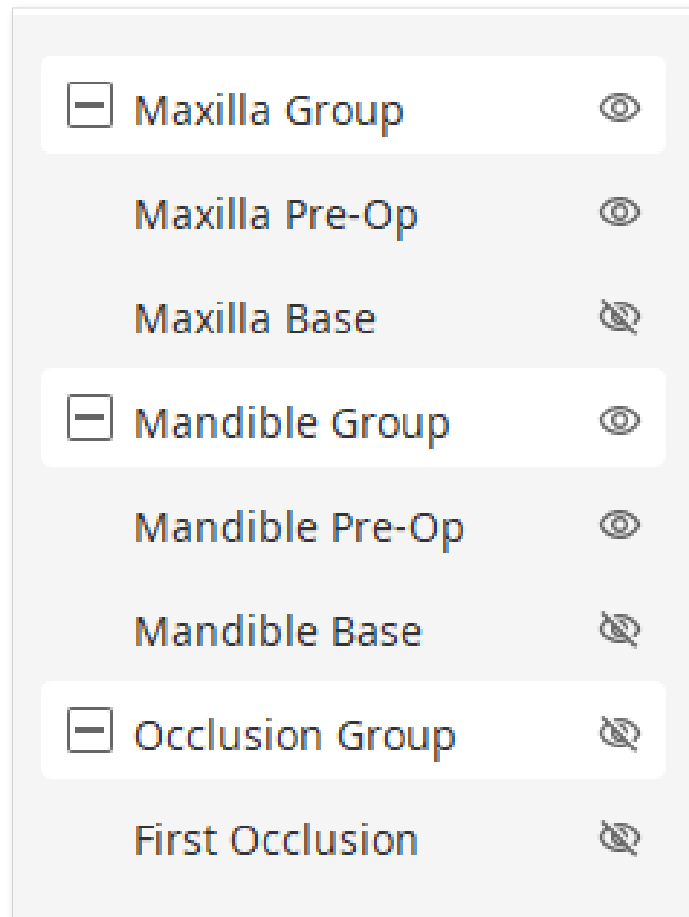
Click on a face of the cube to easily zoom fit and rotate the data to the corresponding view.



## Data Tree

Data Tree is located on the right-side panel and shows the data you use in groups.

It allows you to control the visibility of data groups or each data individually. Click the eye icon to show or hide data; hover over the titles to adjust the transparency slider.














# Modes

Modes in this app are not subject to any specific sequence. You can choose which ones you want to work in depending on your needs.

There are two icons that do not represent an individual mode but rather the beginning and end steps of the overall workflow - Reassign Data and Complete.

Icon	Tool	Description
	Reassign Data	Start again from the data assignment.  Initialize the process by changing what data is assigned as maxilla, mandible, and occlusion.
	Overview Mode	Create section planes and analyze data through section views.  Overview Mode is entered by default when no other mode is selected.
	Auto Analysis Mode	Review the results of the automatic occlusion analysis.
	Alignment Mode	Manually align the maxilla, mandible, and occlusion data.
	Edit Mode	Edit and trim data using the wide array of functions provided.
	Mandibular Movement Mode	Play the mandibular movement recording.
	Complete	Overwrite or export files to save the changes and close the program.  Read more about saving data in the "Data Management" chapter.

# Overview Mode

In Overview Mode, you can closely examine your imported data and work with the Section View feature, which allows you to conduct a more detailed analysis of the occlusal relationship.

This mode is entered by default when no other mode on the left-side panel is selected.



On the right side of the window, you can find a tools panel that includes all key features needed to perform occlusal analysis. With certain limitations, all of them can be used across all modes.

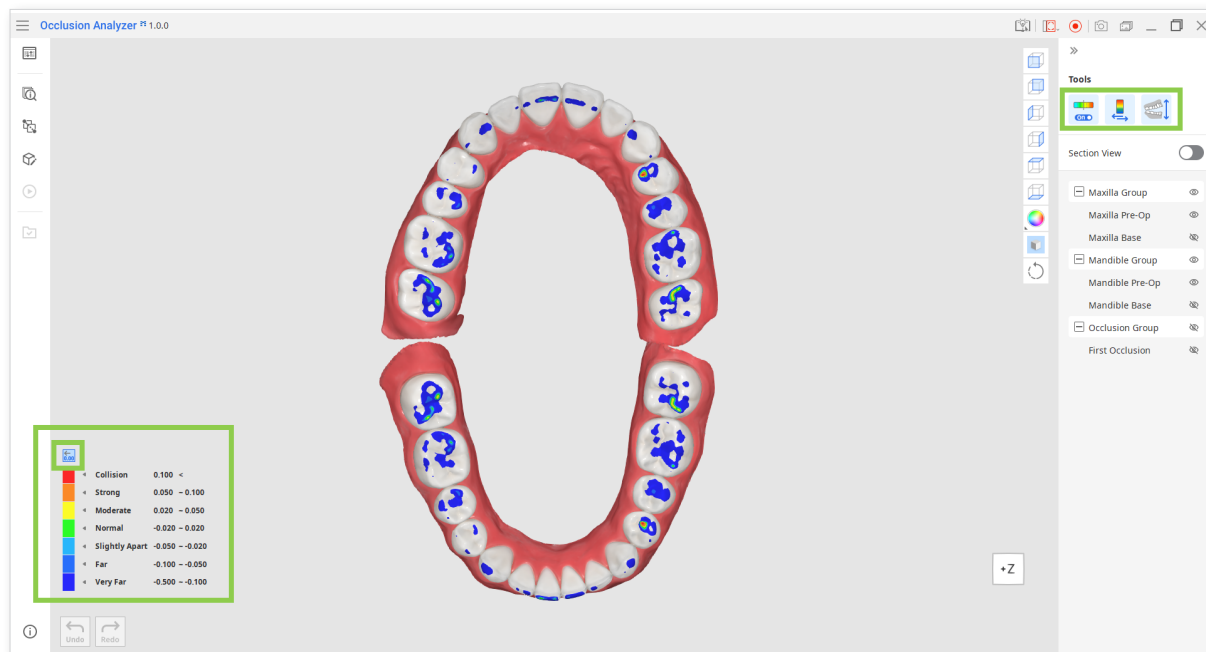
## Tools

Icon	Tool	Description
	Color Map On/Off	Turn on or off the color map.
	Switch Deviation Display Area	Switch deviation display scale between all data and contact area only.
	Switch View	Change the view between opened jaws and closed jaws.
Section View	Section View	Turn on the toggle to utilize tools for section view creation and management.

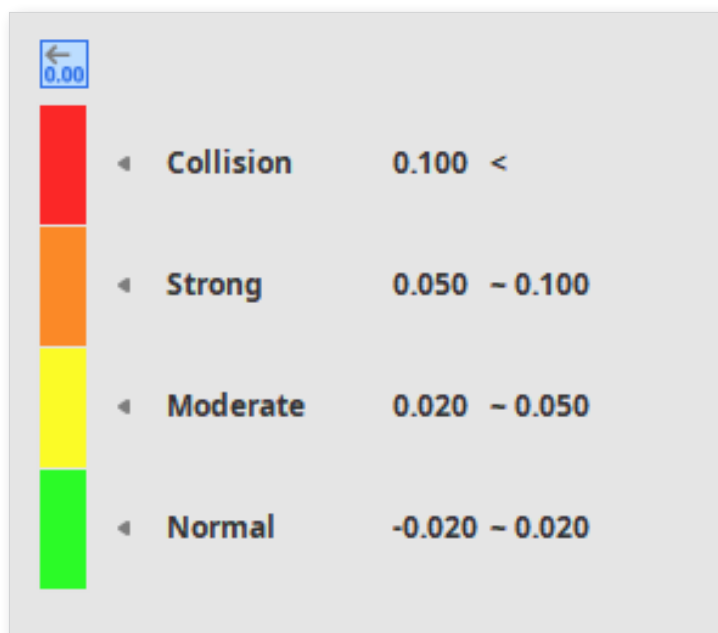
## How to use Color Map

Color Map is on by default. It shows the contact relationship between the maxilla and mandible. Refer to the color map legend in the left corner of the window to help you analyze the bite.

Use the icon at the top of the color bar legend to expand it and show specific value ranges for each color.

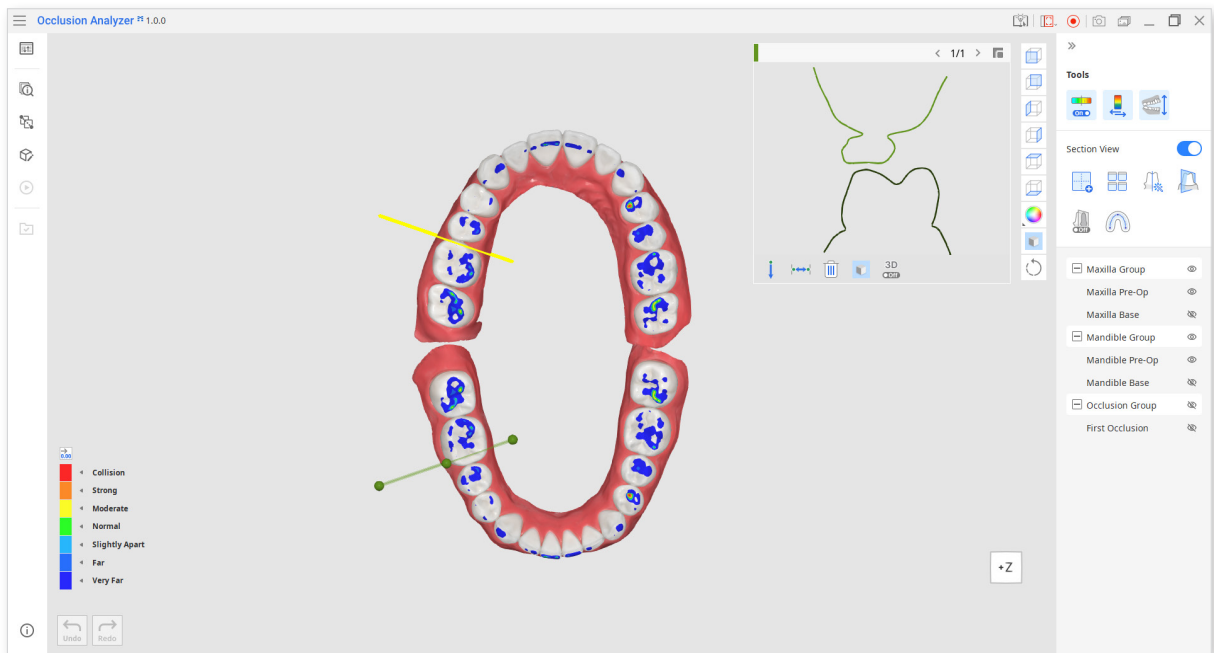


If you want to see only the contact points data, click “Switch Deviation Display Area” and the color bar will be limited to positive values only.



## How to work with section views

Turn on the Section View toggle to work with section planes.



### Tools: Section View

Icon	Tool	Description
	Add Section Plane	Add a new section plane.
	Multi-View	Show section views for all planes.
	Auto Section	Automatically add planes in areas of occlusal interference.
	Show/Hide Section View	Display or hide section lines, planes, and the section view window.
	Dynamic Clipping	Show a cross-sectional view in real time while you move the section plane.
	Set Arch Line	Manually create or adjust the arch line.

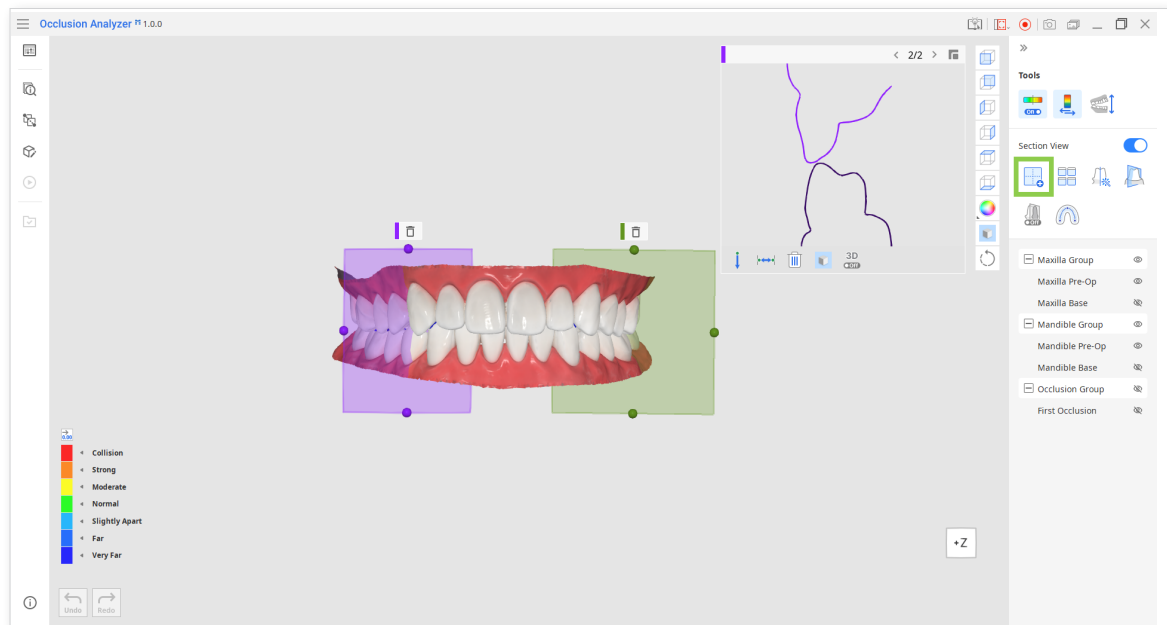
1. Use “Add Section Plane” to create a new section plane in the areas of your interest. You can create up to 4 planes.

Click and drag each plane to change its position if needed. To delete a plane click the trash bin icon at the top of the plane.



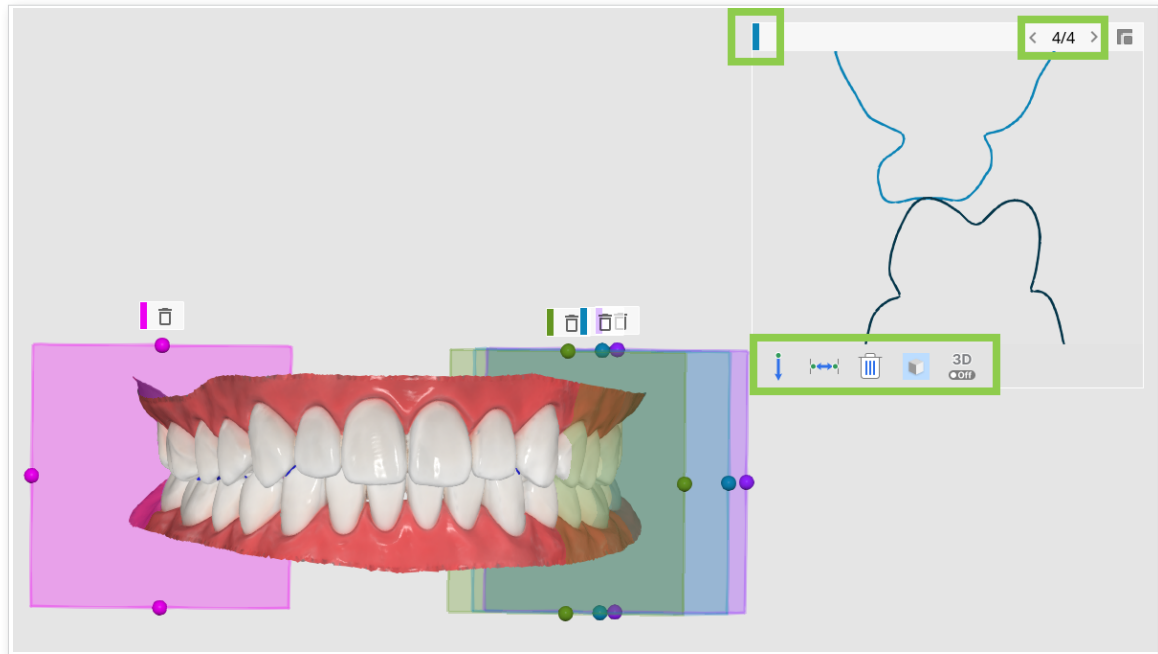
You can also use “Auto Section” for the program to automatically create planes in the areas of occlusal interferences.

Note that using it will delete any planes that were created before.



- Each section plane has its own section view window. They are color-coded for easy identification.

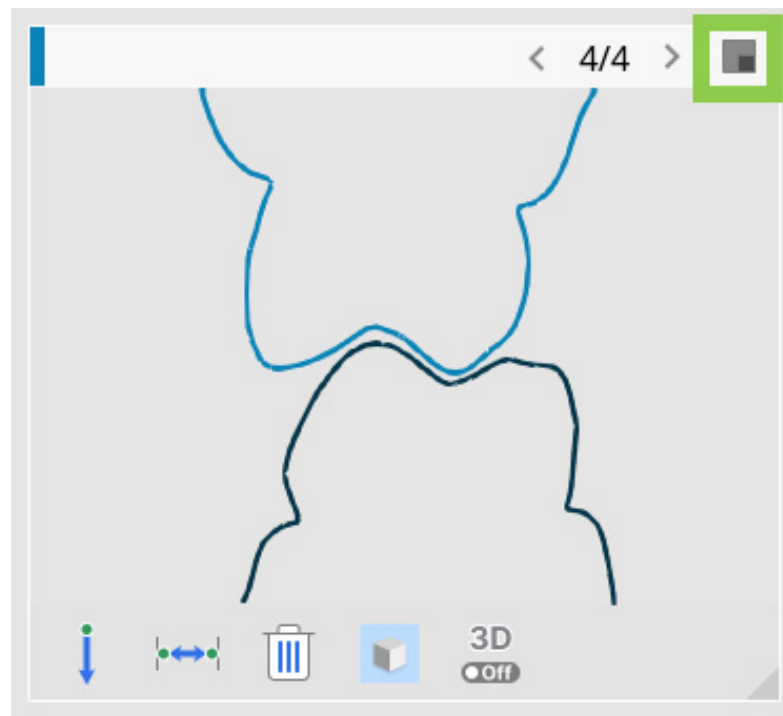
Use the right and left arrows at the top to switch between section views. Use the mouse wheel to zoom in on the view.



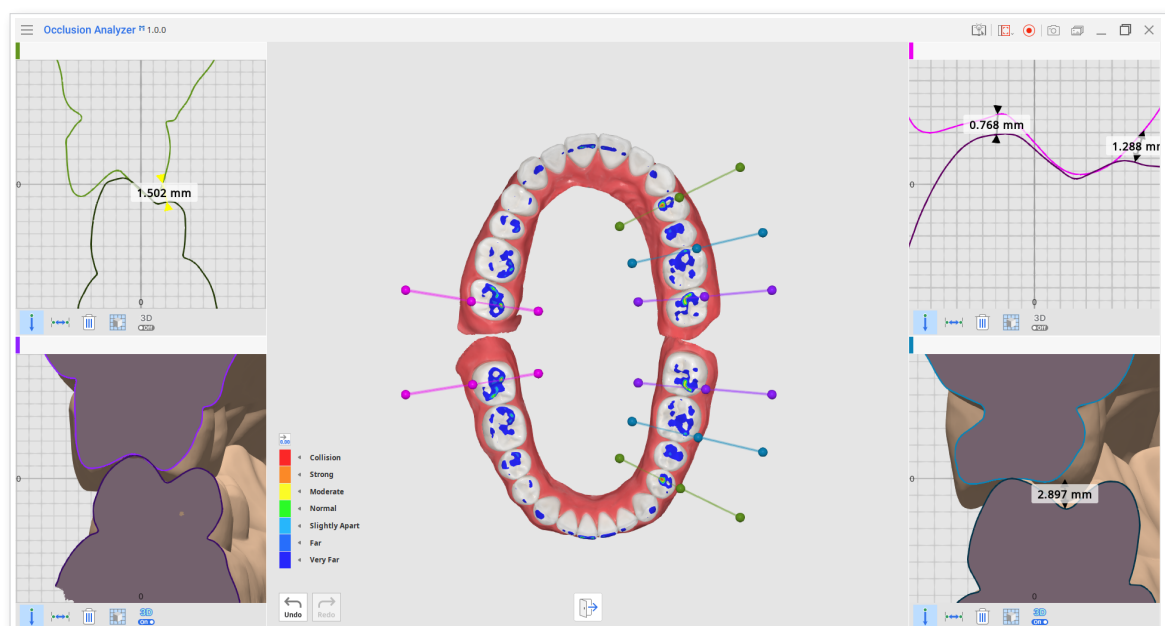
- There are 5 tools provided within a section view window.

<b>Measure Distance by One Point</b>	Measure the shortest distance to the adjacent 3D data or line.
<b>Measure Distance by Two Points</b>	Measure the distance between two points.
<b>Delete Measurement Results</b>	Delete measurement results by clicking on them.
<b>Grid (mm)</b>	Show or hide the grid.
<b>3D View</b>	Show the section view in 3D.

- By default, the position and size of the section view window are fixed. Click the top right corner to enable moving and resizing; click it again to return to the default state.



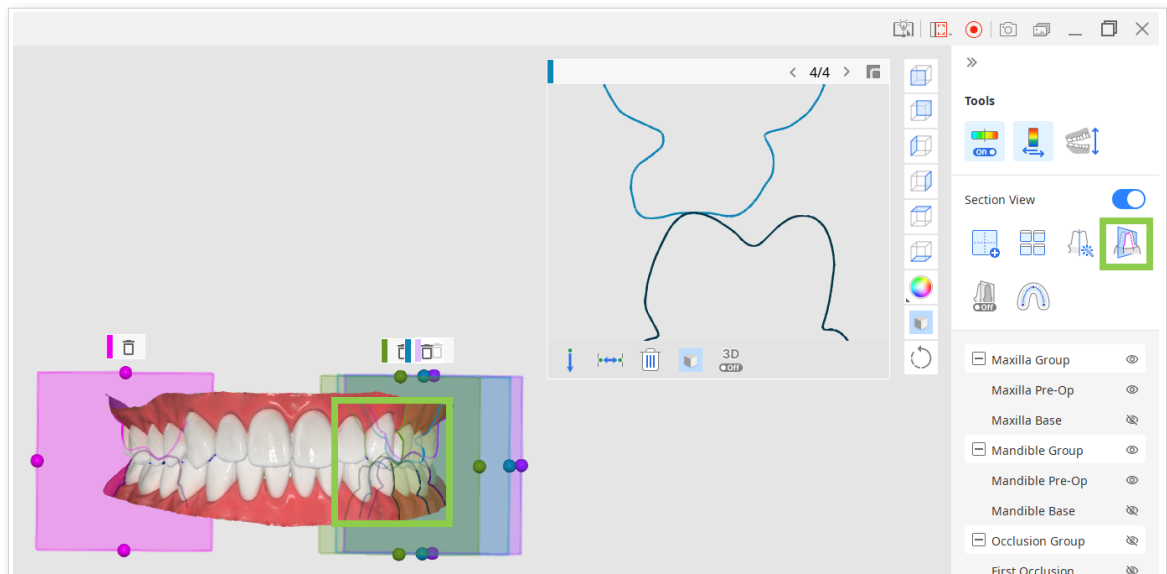
3. If you want to compare section views for all created planes, use the “Multi-View” feature.



4. Click the "Show/Hide Section View" icon once to show section lines. Then click again to hide the section view window, section planes, and lines. Use this feature to preserve created planes while working in other modes.



If you instead turn off the Section View toggle, all your created planes will be deleted.

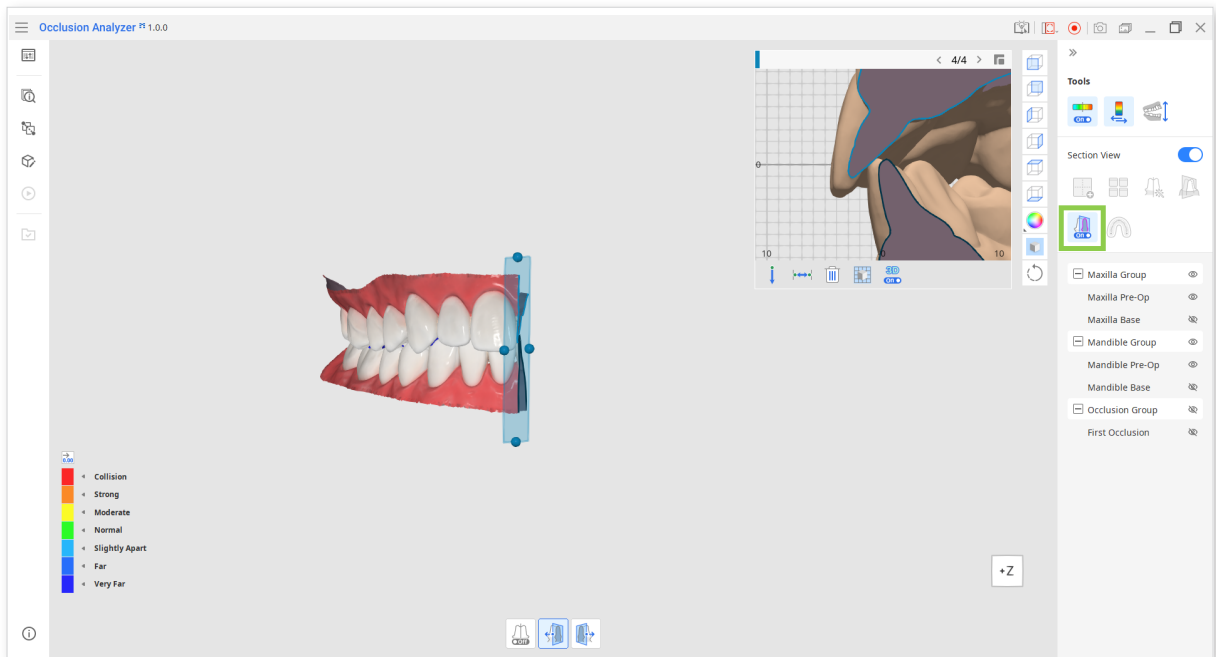





## How to use Dynamic Clipping




Dynamic Clipping shows a cross-sectional view in real time while you move the section plane.

You can clip data on the left or right side of the plane or use Auto Directing, which will switch the clipping direction as you move the plane along the arch line.



 Use control points on the plane to rotate it.

## Toolbox: Dynamic Clipping

Icon	Tool	Description
	Auto Directing	Automatically change the clipping direction when moving the plane.
	Right Clipping	Clip data on the right side of the plane and show only the left side.
	Left Clipping	Clip data on the left side of the plane and show only the right side.

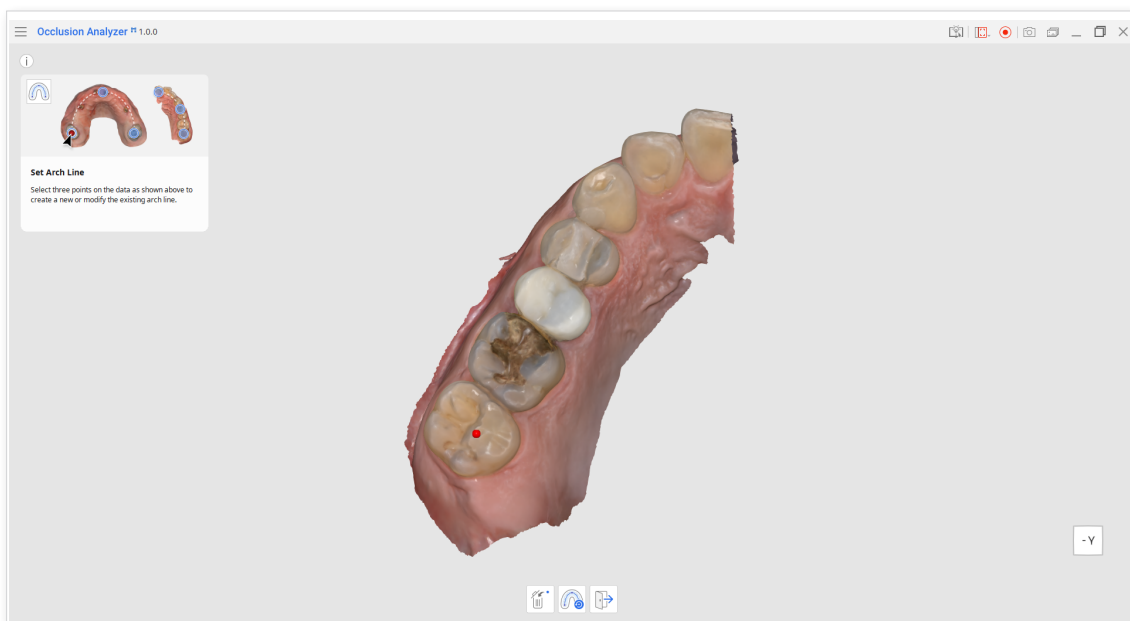
## How to use Set Arch Line

To work in the app, the program must be able to detect an arch line on your data.

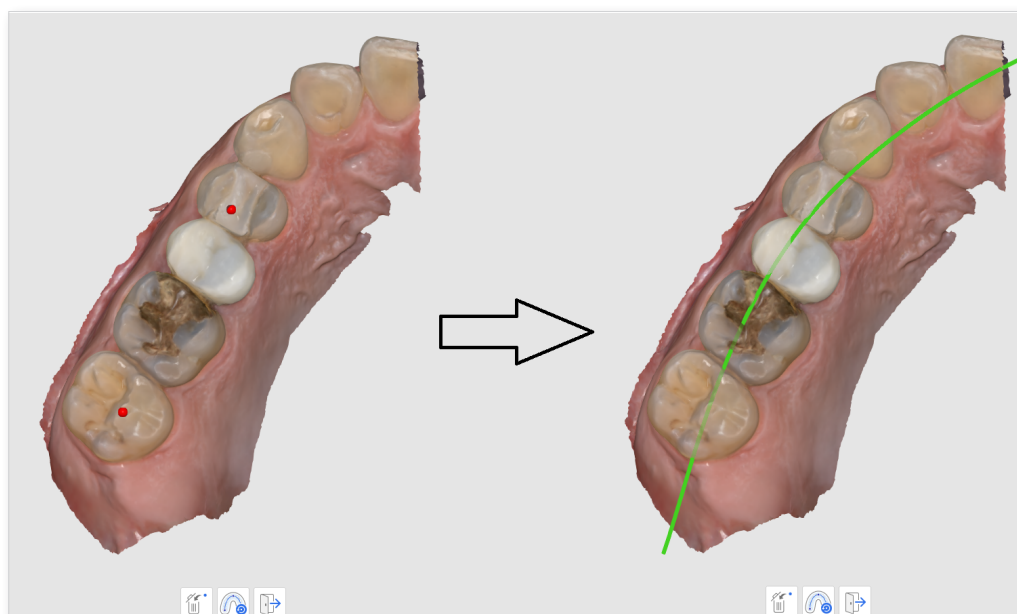
If an arch line is not detected upon importing data, you will be asked to set one. It can be also adjusted later.



If you're using scan data with only one quadrant of both maxilla and mandible, the app may ask you to set the arch line manually upon entering.






1. Select three points on the data following the curvature of the arch, and an arch line will be created.



- You can delete the last created point to correct the line using the “Delete Marker Point” feature.
- If you’re adjusting the existing arch line, you can reset to the last saved one using “Reset.”

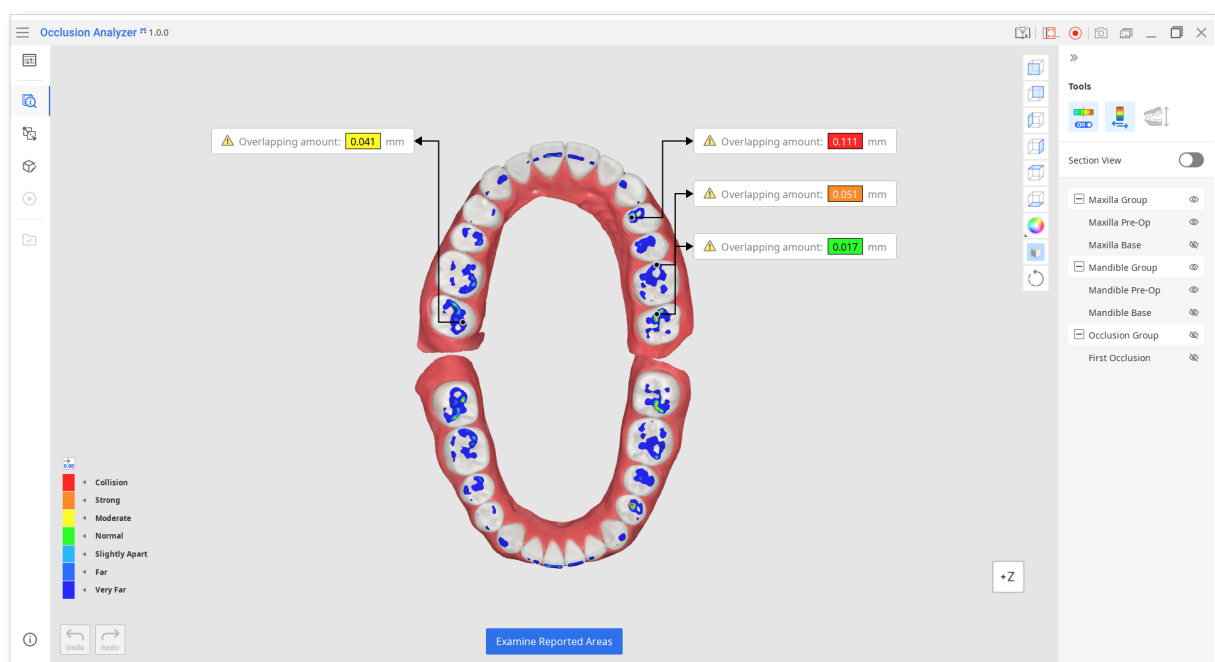
2. Click “Exit” when done, and the arch line will be saved.

Icon	Tool	Description
	Delete Marker Point	Delete the last created marker point.
	Reset	Restore previously saved arch line.
	Exit	Go back to the previous step.

## Auto Analysis Mode

This mode is entered automatically after data assignment. Here you can review the results of automatic occlusion analysis through the color map.

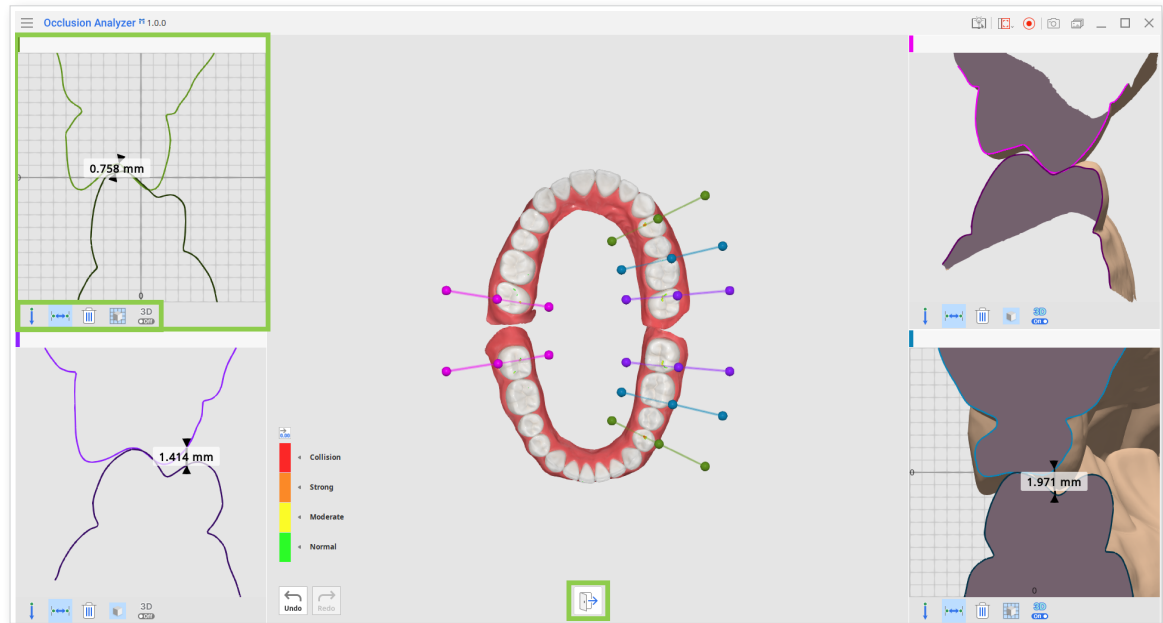
Annotations signify areas with occlusal interferences and report specific values for overlapping amounts.





- To make measurements and control view options, utilize tools provided in every section view window.

Each section plane and its corresponding section view window are marked by the same color.



### Toolbox in Section View Window

Icon	Tool	Description
	Measure Distance by One Point	Measure the shortest distance to the adjacent 3D data or line.
	Measure Distance by Two Points	Measure the distance between two points.
	Delete Measurement Results	Delete measurement results by clicking on them.
	Grid (mm)	Show or hide the grid.
	3D View	Show the section view in 3D.

- When done, click "Exit" at the bottom and you will be redirected to Overview Mode.



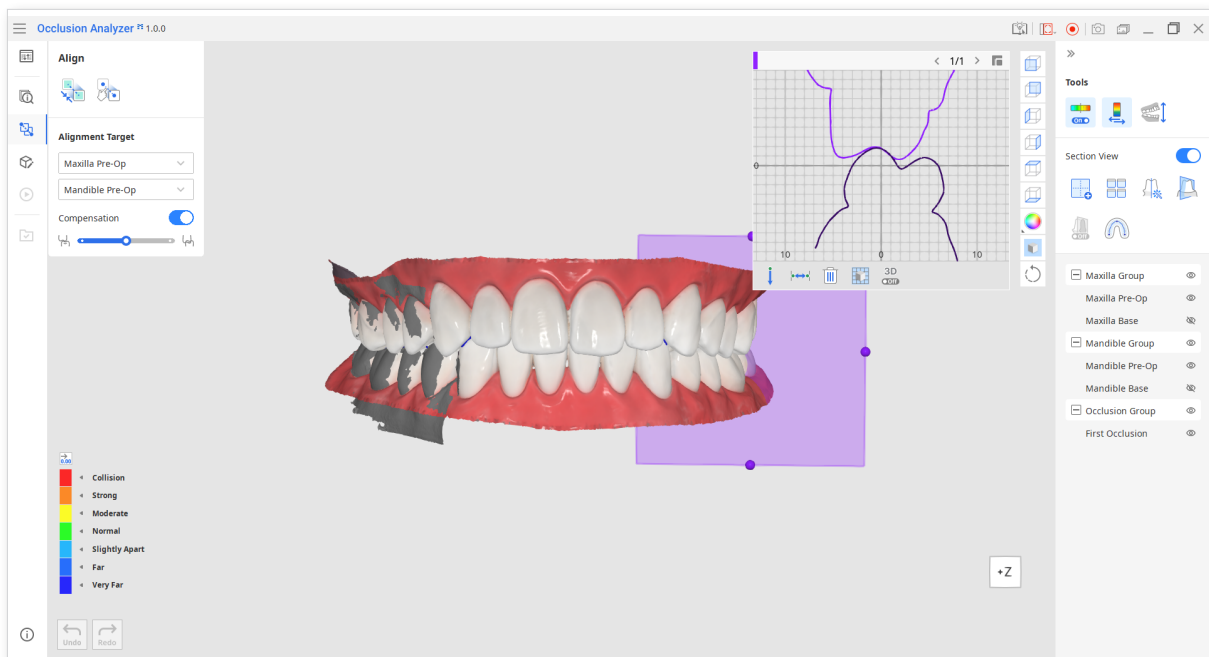
If you enter this Auto Analysis Mode again after working with section planes elsewhere, all your created planes will be removed to perform automatic analysis.

## Alignment Mode

Use tools provided in Alignment Mode if you need to realign your scan data.

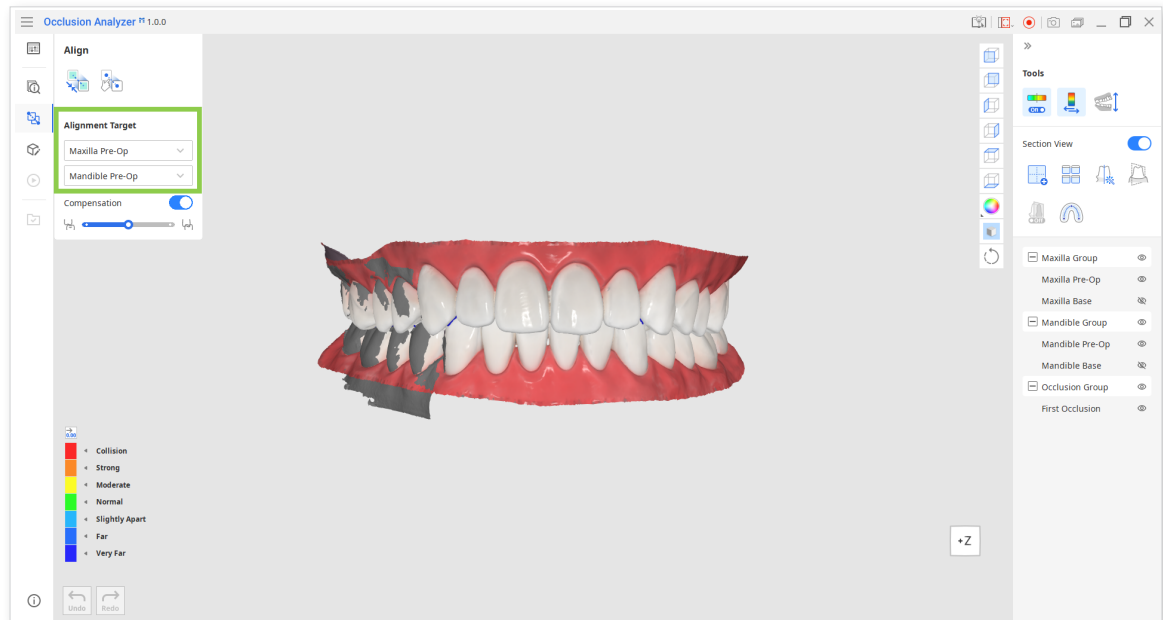


If the section planes are in the way while you are working in this mode, use "Show/Hide Section View." It will preserve your work results with Section View while temporarily hiding section planes.

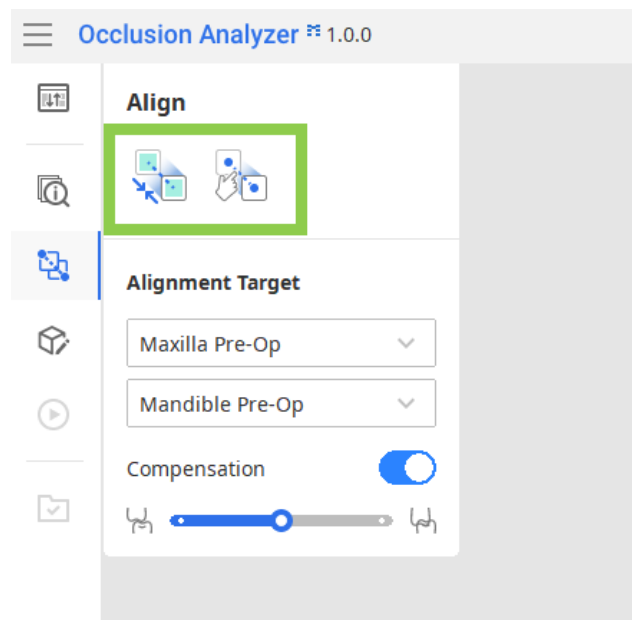


1. First, select the alignment target in the toolbox. If you imported only one data set into the app, that data would automatically be set as the target.

If you assigned more than one scan data to the maxilla and mandible, find your target data in the drop-down menu.



2. Then choose between two alignment options in the toolbox on the left: Align Selected Areas or Manual Alignment.



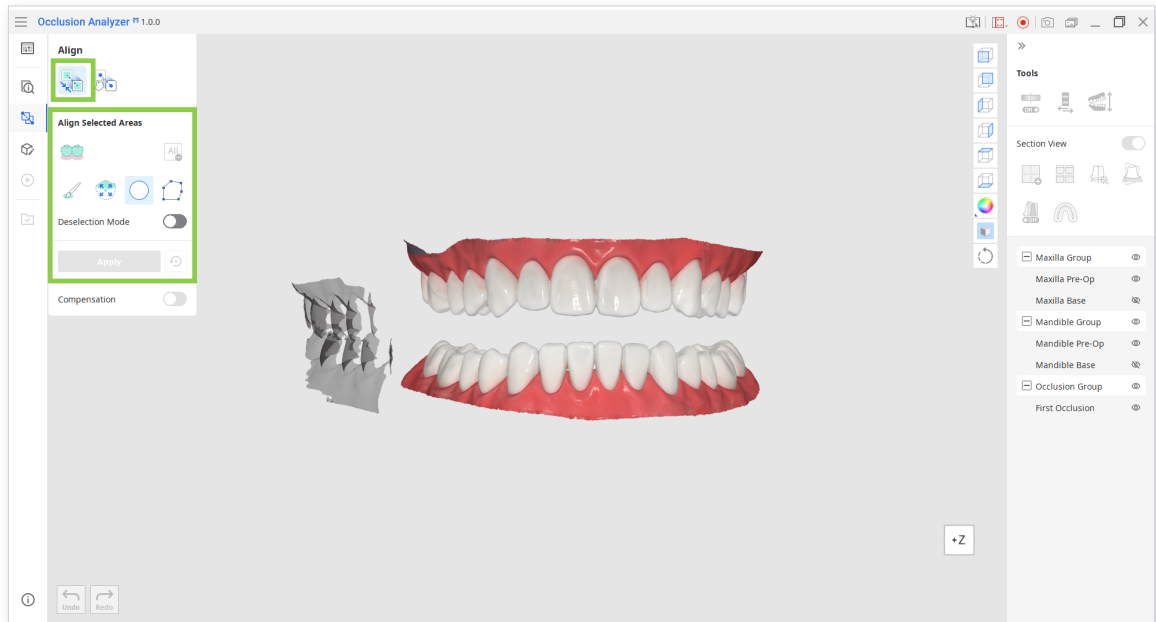
Remember to use “Complete” if you want to save changes in data alignment.

Read more on saving changes in the “Data Management” chapter.

## How to use Align Selected Areas

This tool allows you to align maxilla and mandible scans with occlusal ones based on the selected area.

1. First, choose Align Selected Areas in the toolbox.



2. To align data, select an area of the maxilla and mandible corresponding to the occlusal scan data.

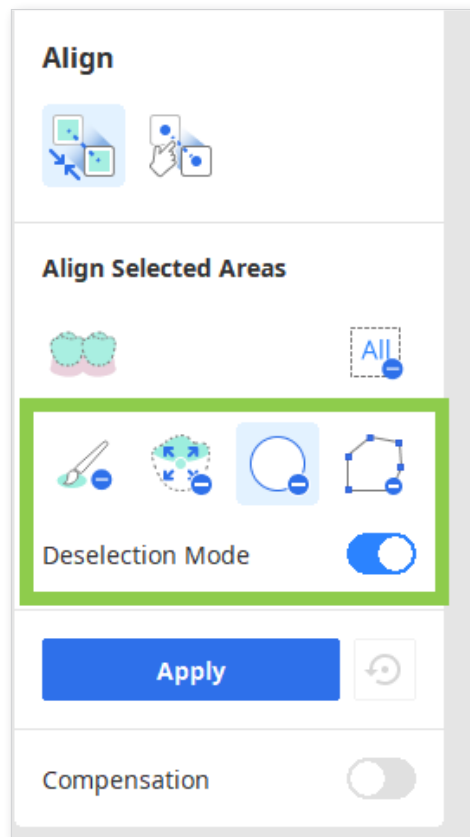
Choose among available selection tools:

<b>Smart Teeth Selection</b>	Click it to automatically select all teeth data at once, excluding the gingiva.
<b>Smart Single Tooth Selection</b>	Select individual tooth data, excluding gingiva and other teeth data. Click and drag until only your target tooth data is selected.
<b>Circle Selection</b>	Click and drag to create a circular area; release to complete the selection of data within the circle.
<b>Polyline Selection</b>	Selects areas within the polyline shape drawn on the screen. Left-click to draw the polyline shape and right-click to close the shape and finish the selection.
<b>Brush Selection</b>	Click and drag to select areas on the freehand-drawn path. Note that compared to polyline, only the visible surface will be selected.

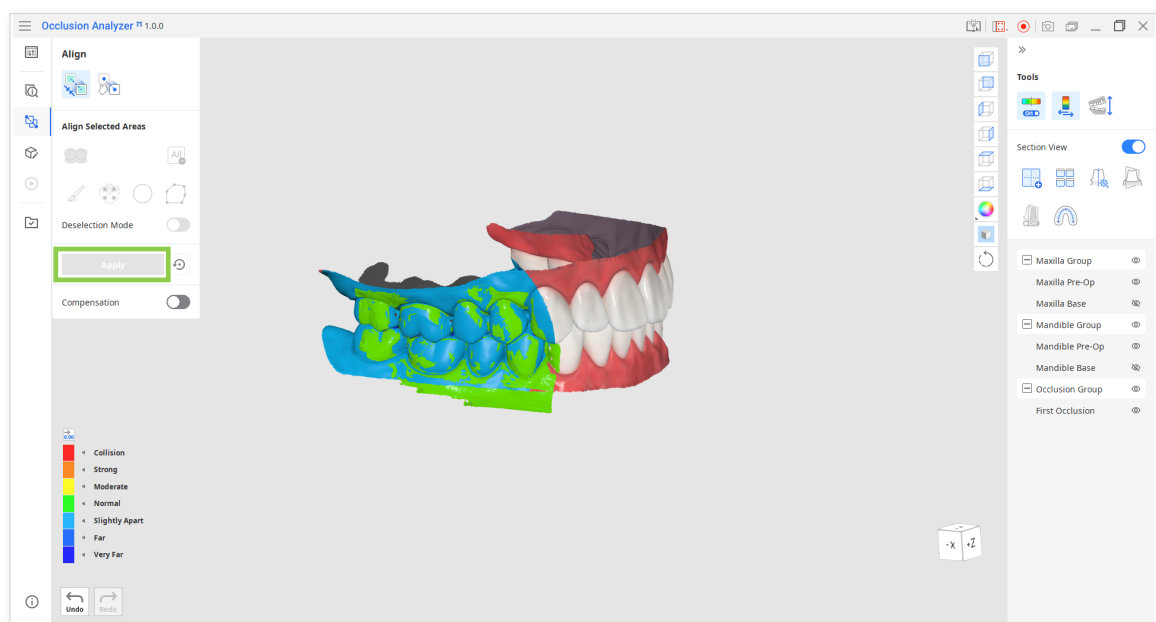


3. The "Deselection Mode" toggle is used to correct the selected areas. It changes the effect of all selection tools to deselecting.

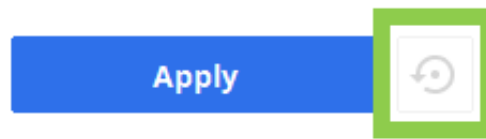
You can also clear all your selections at once by clicking "Clear All Selection."



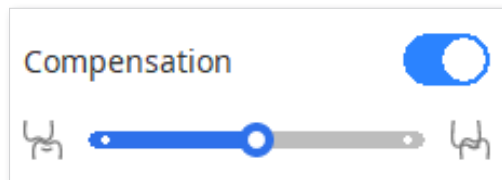
4. When the needed area is selected, click "Apply."










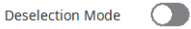
5. If you want to start over, click the initialization icon next to the Apply button.



6. After data is aligned, you can turn on Compensation toggle and adjust the compensation level.



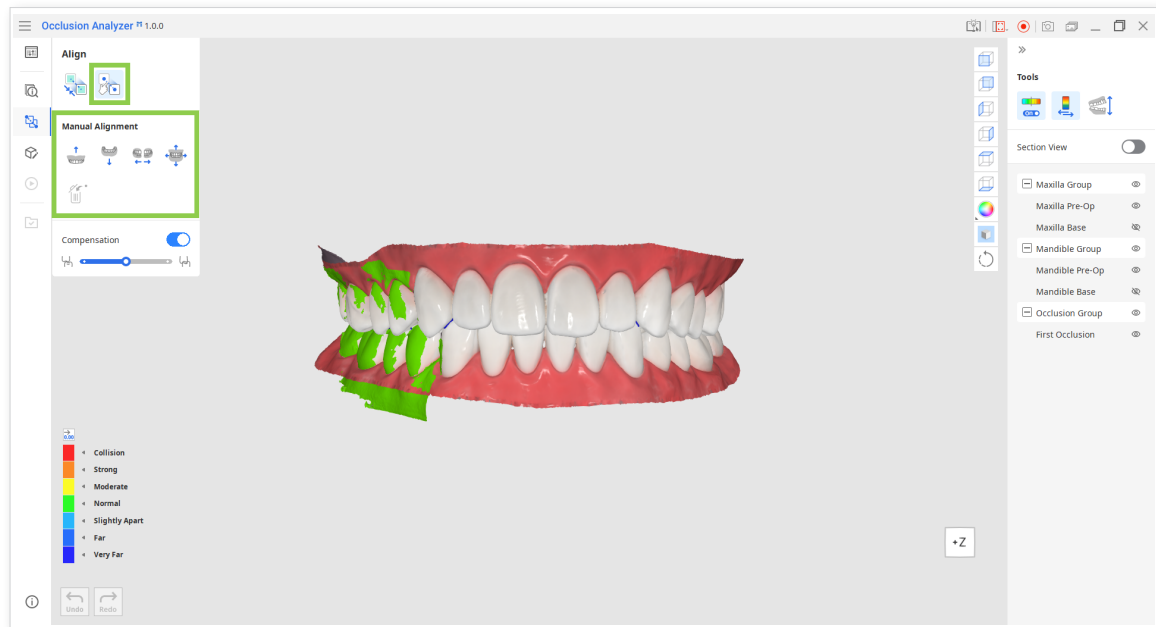
### Toolbox: Align Selected Areas

Icon	Tool	Description
	Smart Teeth Selection	Automatically select only the teeth in the arch, leaving out the gingiva area.   This function is only available for the scan data acquired by Medit Scan for Clinics with the “Use GPU” option on.
	Brush Selection	Select all areas on a freehand-drawn path on the screen. Only the front-facing side will be selected. The brush is available in three different sizes.
	Smart Single Tooth Selection	Automatically select the area of a single tooth, leaving out the gingiva area. Click and drag the mouse on the tooth.
	Circle Selection	Select all entities within the circular area.
	Polyline Selection	Select all areas within a polyline shape drawn on the screen.
	Clear All Selection	Clear all selected areas.
	Deselection Mode	When on, it reverses function of all selection tools.

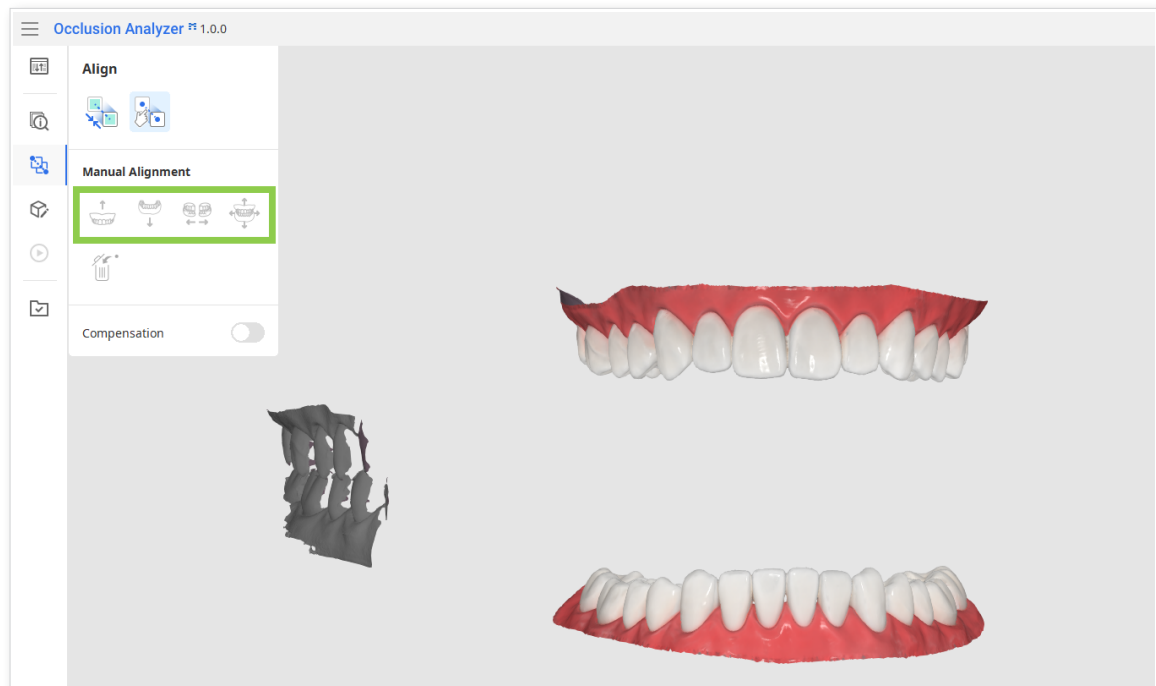
## How to use Manual Alignment

This tool allows you to align data based on the selected points.

1. First, choose Manual Alignment in the toolbox.

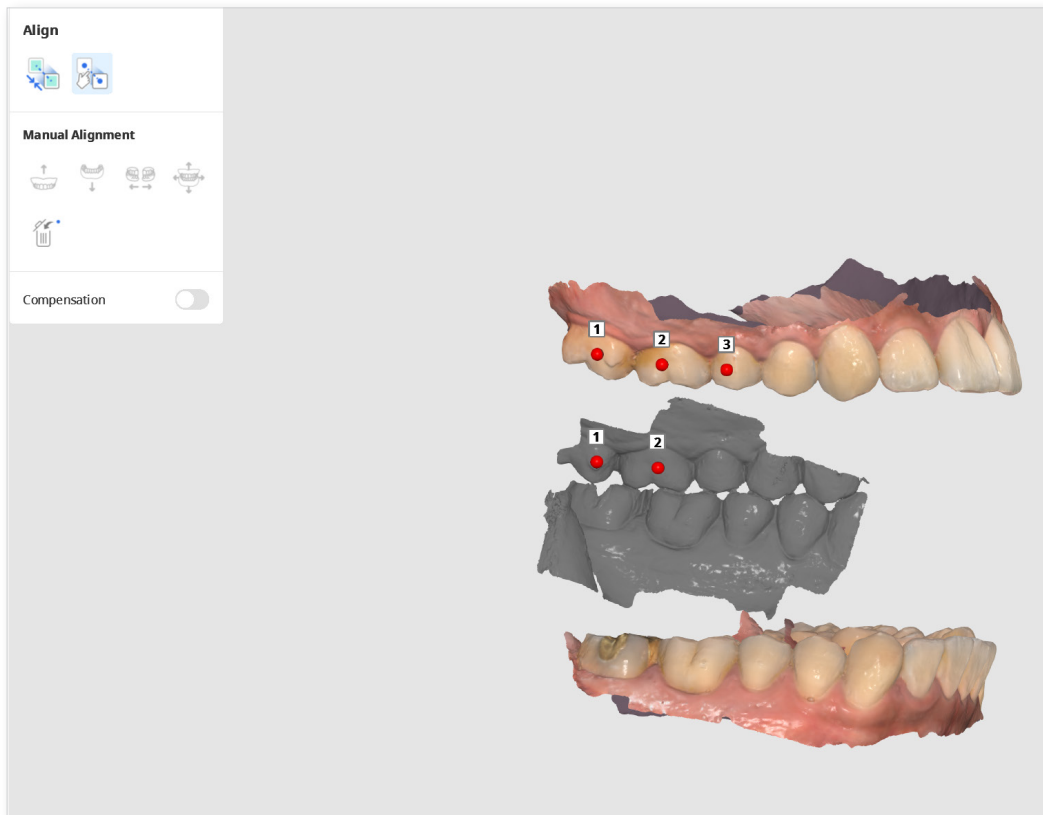


2. Use detach features to move data to the pre-alignment position. Note that you can detach all data at once or one by one.

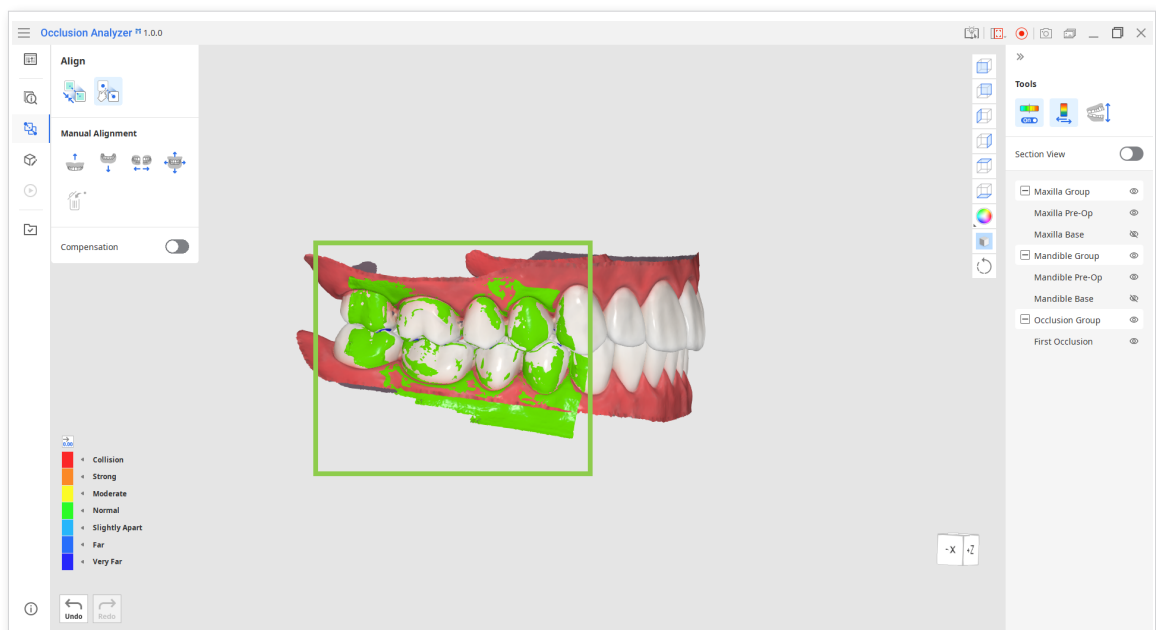


- Then define 2 to 3 points on the maxilla and mandible and their corresponding points on the occlusion data.

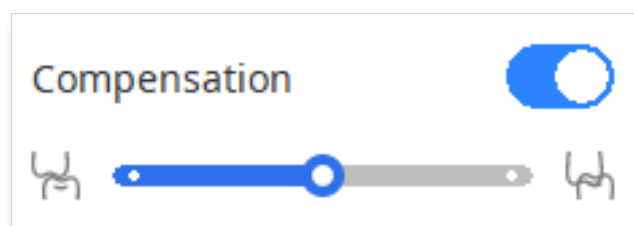
All points can be deleted using “Delete Alignment Points” in the toolbox.





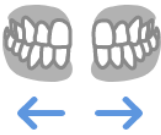
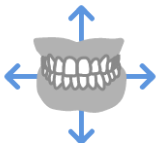

- When done, data will be automatically aligned. Successfully aligned data will be bright green.



- After data is aligned, you can turn on Compensation toggle and adjust the compensation level.



### Toolbox: Manual Alignment

Icon	Tool	Description
	Detach Maxilla	Detaches the maxilla and moves it back to the prealignment position.
	Detach Mandible	Detaches the mandible and moves it back to the pre-alignment position.
	Detach Occlusion Data	Detaches first and second occlusion data and moves them back to the pre-alignment position.
	Detach All	Detaches all data and moves it back to the prealignment position.
	Delete Alignment Points	Remove the points selected for alignment.

## Edit Mode

This mode is provided in case you need to correct or edit your scan data. Use tools from the pop-up toolbox on the left to trim, sculpt, or fill holes.

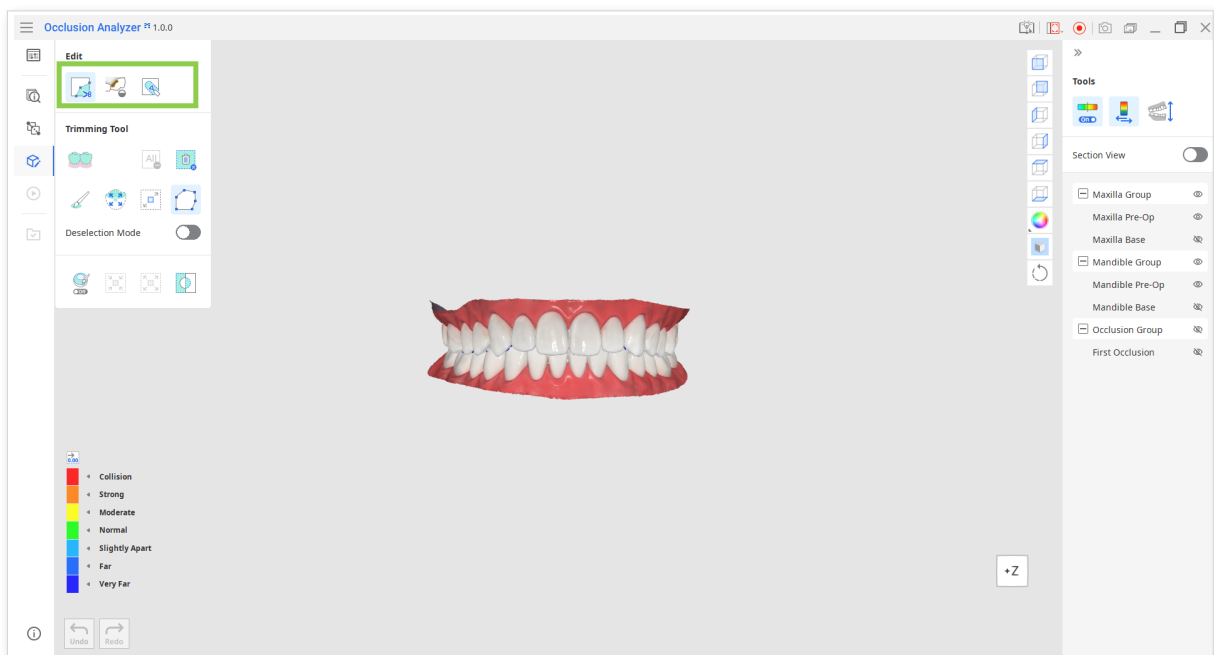
The Section View tool can be used while you edit data. Any changes you make to the data will be reflected in the section view window in real time.



You can show, hide, or change data transparency in the Data Tree to make working in this mode more comfortable.



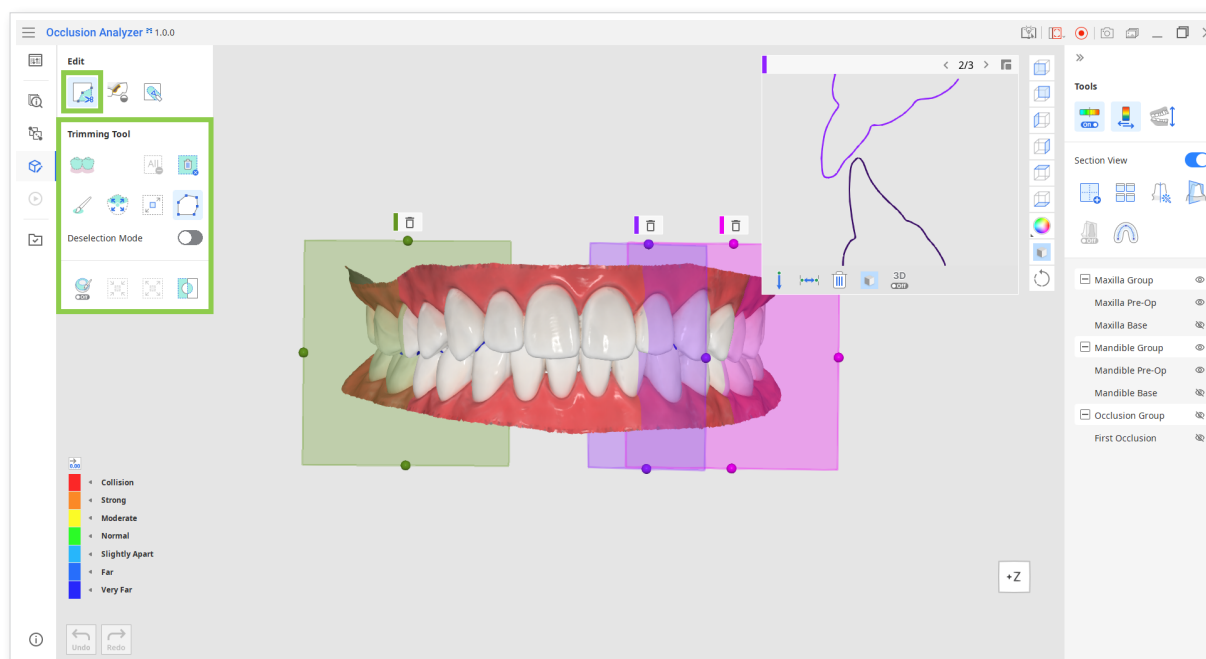
Use the "Show/Hide Section View" feature if the section planes are in the way while you are editing data. It will preserve your work results with Section View while temporarily hiding section planes.



Remember to use "Complete" if you want to save changes you've made. Read more on saving changes in the "Data Management" chapter.

## How to trim data

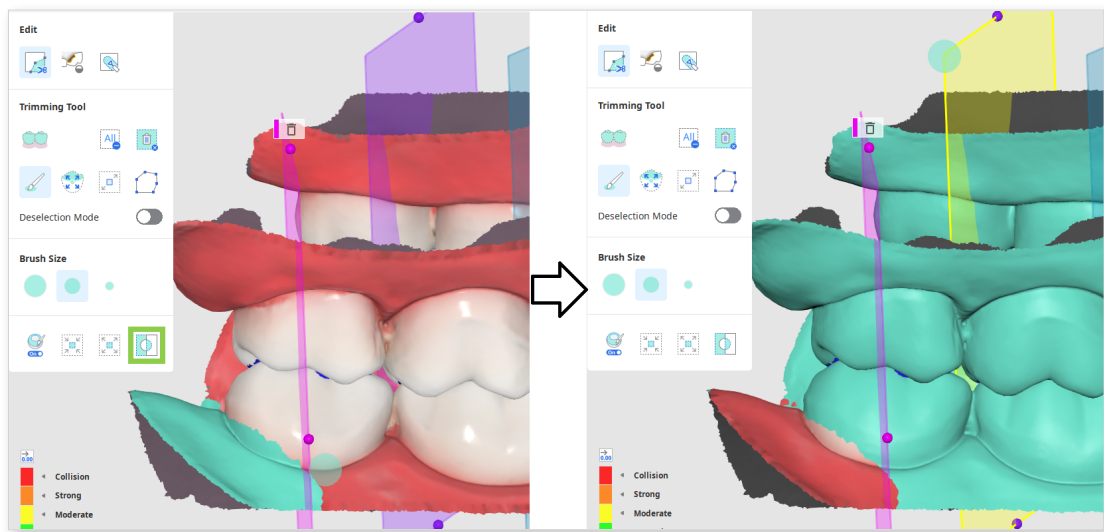
Use the vast selection of tools offered under the Trimming Tool to remove any unwanted data.



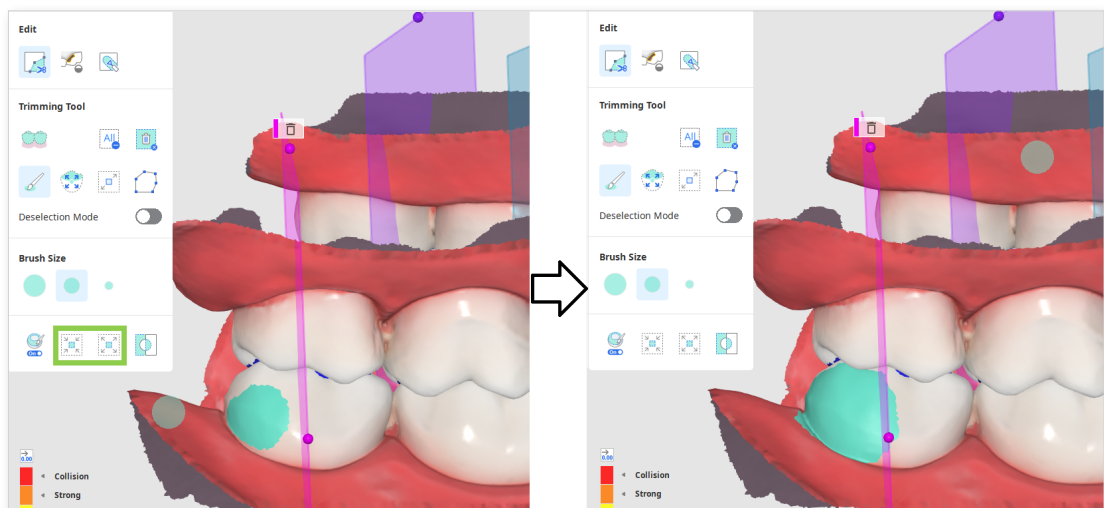
1. To delete any unwanted data part, you must first designate an area for trimming. Choose from the following selection tool options:

<b>Smart Teeth Selection</b>	Click it to automatically select all teeth data at once, excluding the gingiva.
<b>Smart Single Tooth Selection</b>	Select individual tooth data, excluding gingiva and other teeth data. Click and drag until only your target tooth data is selected.
<b>Flood Fill Selection</b>	Click on a single arch data to select it all. Or click and drag to uniformly expand the selection over the entire arch.
<b>Polyline Selection</b>	Selects areas within the polyline shape drawn on the screen. Left-click to draw the polyline shape and right-click to close the shape and finish the selection.
<b>Brush Selection</b>	Click and drag to select areas on the freehand-drawn path. Note that compared to polyline, only the visible surface will be selected.

- Quickly invert the selection by clicking “Invert Selected Area.”



- Slightly enlarge or reduce the selected areas each time you click the “Shrink Selected Area” or “Expand Selected Area” tools.

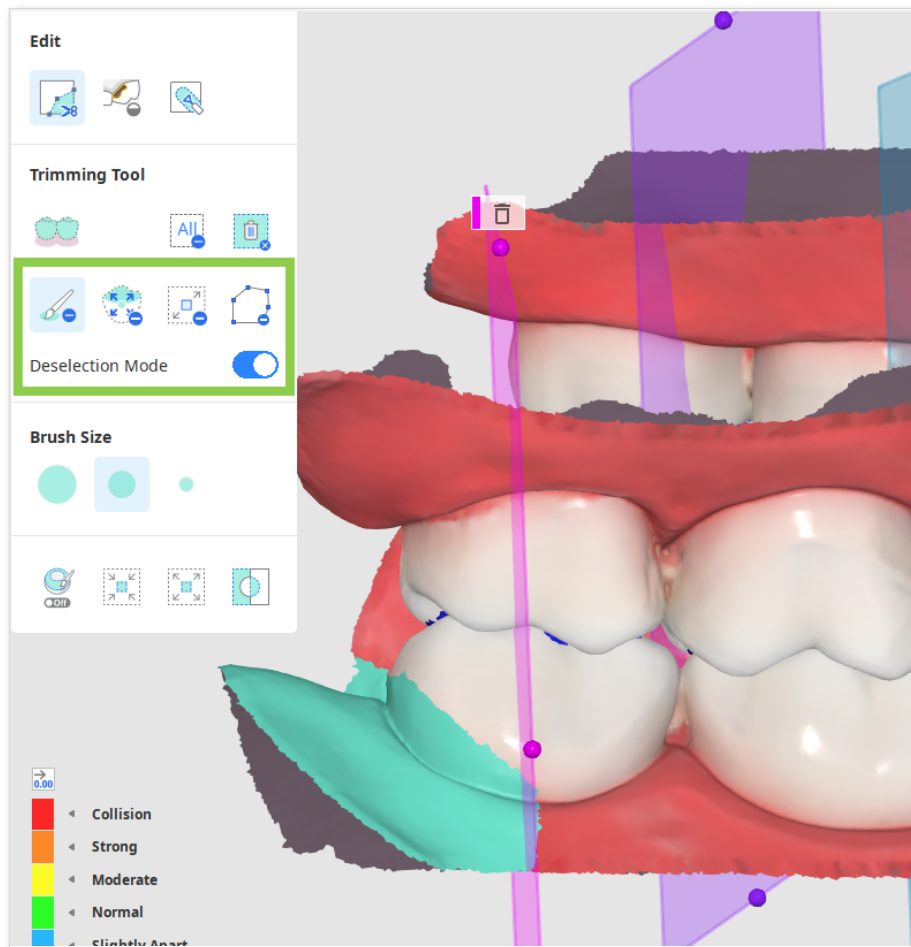


- Turn on “Autofill Selected Area” to automatically select all data within the outline created by the Brush Selection tool.  
Note that it will only work on areas with no holes.







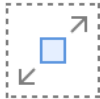





2. The "Deselection Mode" toggle is used to correct the selected areas. It changes the effect of all selection tools to deselecting.




You can also clear all your selections at once by clicking "Clear All Selection."



3. When the target area for trimming is correctly selected, click "Delete Selected Area."

## Toolbox: Trimming Tool

Icon	Tool	Description
	Smart Teeth Selection	Automatically select only the teeth in the arch, leaving out the gingiva area.   This function is only available for the scan data acquired by Medit Scan for Clinics with the "Use GPU" option on.
	Brush Selection	Select all areas on a freehand-drawn path on the screen.  Only the front-facing side will be selected.  The brush is available in three different sizes.
	Smart Single Tooth Selection	Automatically select the area of a single tooth, leaving out the gingiva area.  Click and drag the mouse on the tooth.
	Flood Fill Selection	Select the connected area based on the mouse movements.
	Polyline Selection	Select all areas within a polyline shape drawn on the screen.
Deselection Mode 	Deselection Mode	When on, it reverses function of all selection tools.
	Clear All Selection	Clear all selected areas.
	Delete Selected Area	Delete the data from the selected area.
	Autofill Selected Area	Turn on to automatically fill the selected area. This function can be turned on and off.

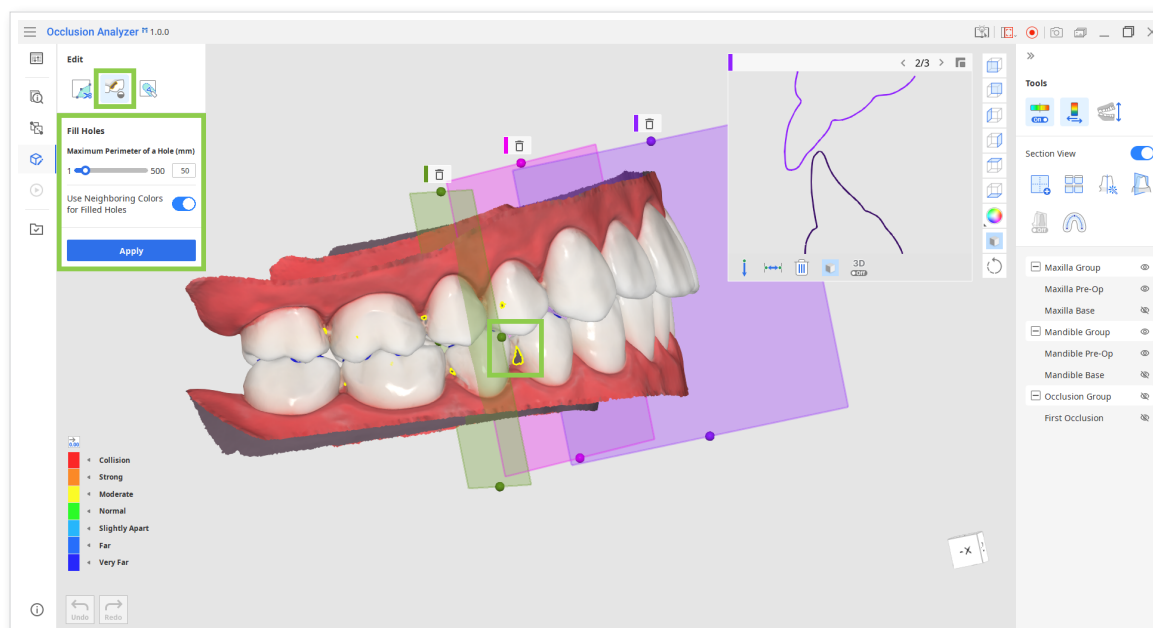
	<p>Shrink Selected Area</p>	<p>Reduce the selected area each time you click the button.</p>
	<p>Expand Selected Area</p>	<p>Expand the selected area each time you click the button.</p>
	<p>Invert Selected Area</p>	<p>Invert the selection.</p>

## How to fill holes

1. Select the Fill Holes tool in the toolbox and adjust the slider for the maximum perimeter of a hole.
2. Turn on “Use Neighboring Colors for Filled Holes” and the program will match the color of the filled areas with data around it. Otherwise, the filled areas will be grey.
3. Click “Apply” to see the result.



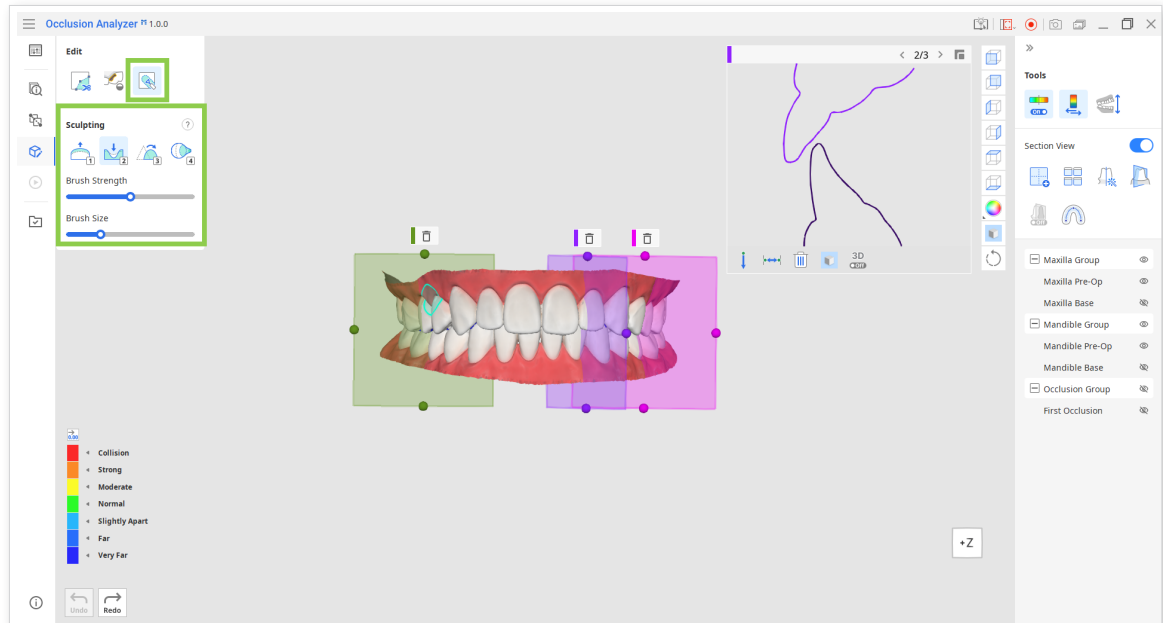
Note that any holes exceeding the size you set will not be filled.



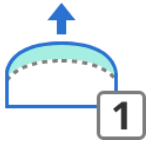
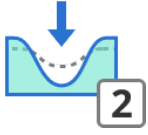




## How to sculpt data

1. Select Sculpting in the toolbox.
2. Modify your data by adding, removing, smoothing, or morphing the data.

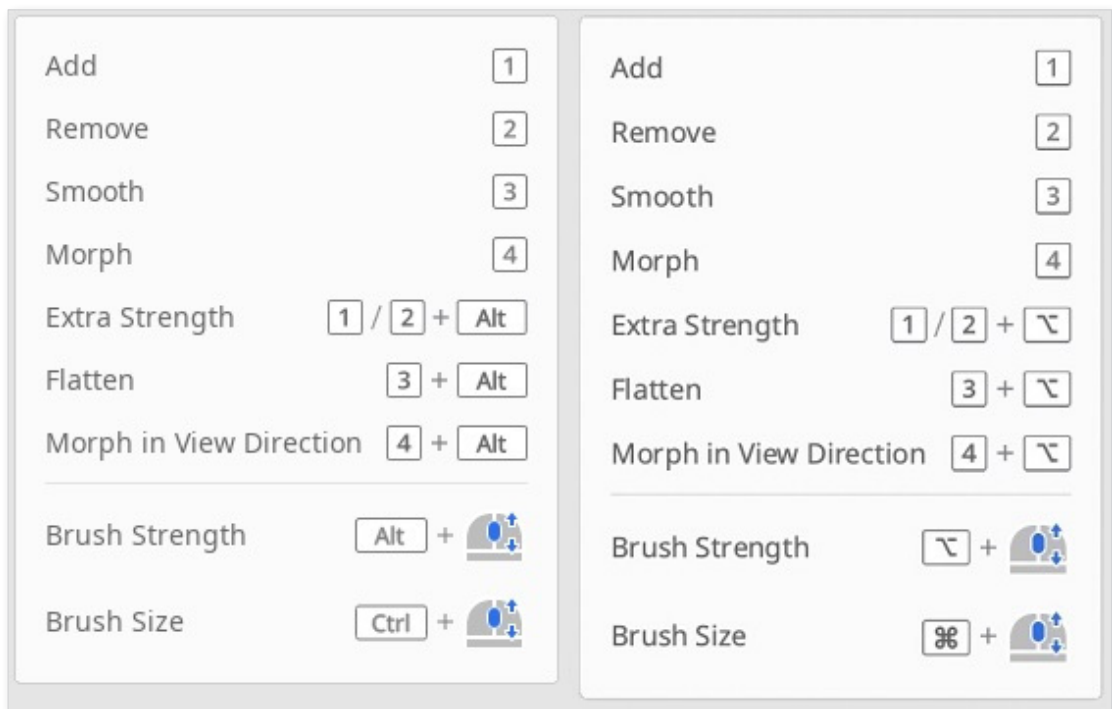
Note that the brush strength and size must be adjusted individually for each tool.



## Toolbox: Sculpting

Icon	Tool	Description
	Add	Use the mouse to add on parts of the data. Hotkey: 1
	Remove	Use the mouse to remove parts of the data. Hotkey: 2
	Smooth	Use the mouse to smooth parts of the data. Hotkey: 3
	Morph	Use the mouse to morph parts of the data. Hotkey: 4
	Brush Strength	Adjust the strength for each of the tools.
	Brush Size	Adjust the brush size for each of the tools.

- Check out the sculpting shortcuts below for easier and faster work.

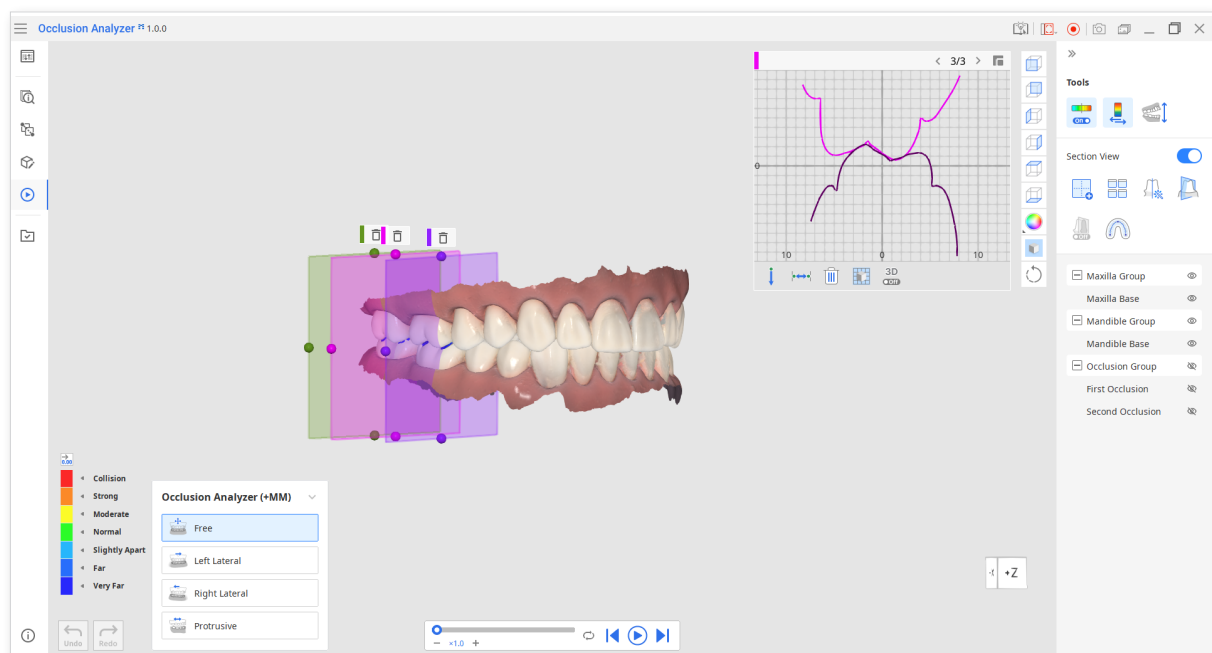


<Sculpting shortcuts for Windows and macOS.>

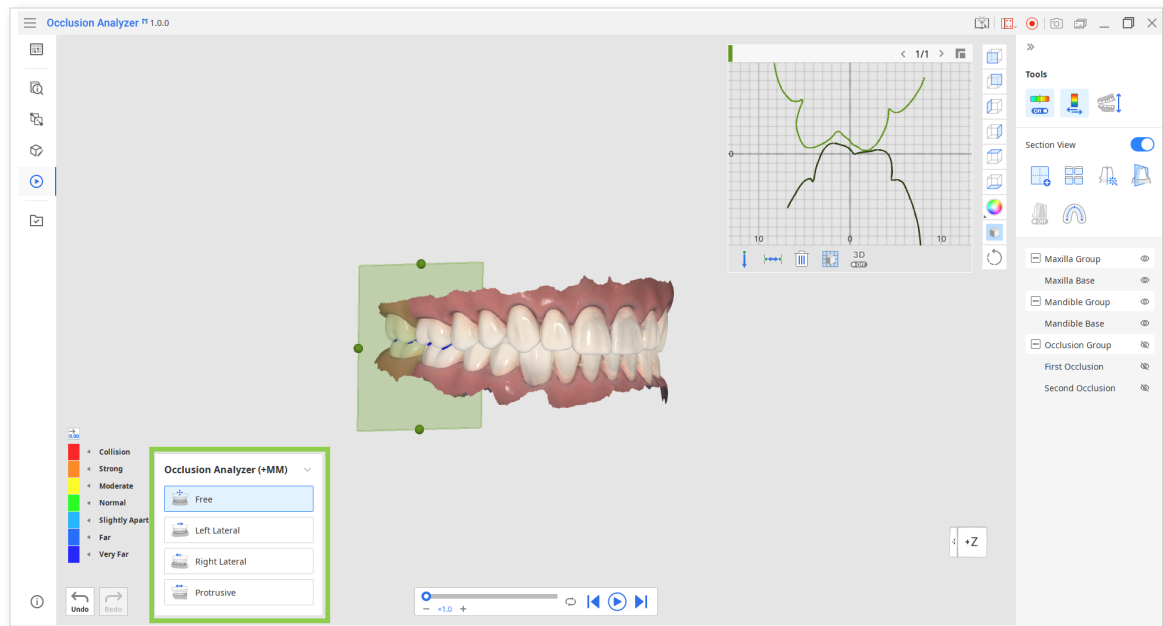
## Mandibular Movement Mode

If you have the recordings of the patient's mandibular movement captured in Medit Scan for Clinics, they will be automatically imported into the app.

Analyse occlusion relationship through section view or color map while replaying available recordings in the Mandibular Movement Mode.



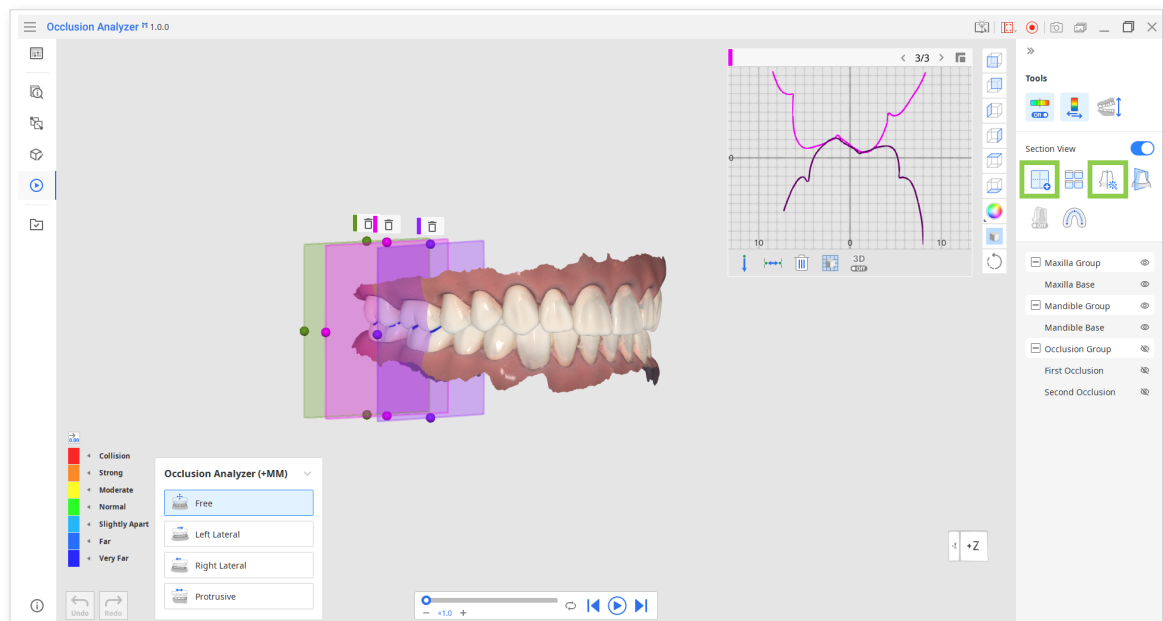
1. All mandibular movement recordings available in the case will be imported and listed in the playlist near the color bar.



2. Add section planes in places of occlusal interference or use the “Auto Section” feature.



Read more on how to use Section View features in the “Overview Mode” chapter.

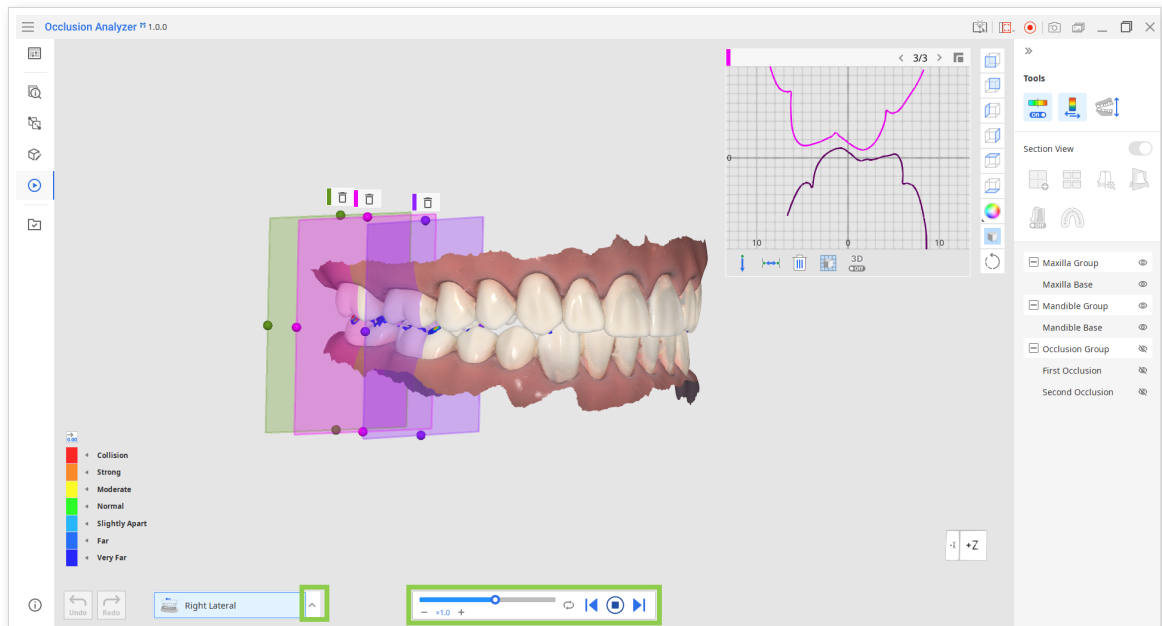


3. Then choose a recording of your interest from the playlist and click the play button.

You can collapse the playlist if it restricts the view.



You cannot use the Section View tool while the replay is on.



4. You can check real-time changes in the section view window. Or switch to opened jaws view using “Switch View” and examine changes through color. Pause the recording replay by clicking stop if needed.

